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SOCIETY OF MOTION PICTURE AND TELEVISION ENGINEERS

Headquarters Office: 55 West 42d St., New York 36, N.Y. Cables: Somopict Telephone: LOngacre 5-0172

Executive Secretary: CHARLES S. STODTER

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Journal of the Society of Motion Picture and Television Engineers

VOLUME 70 • NUMBER 5 • MAY 1961

Progress Committee Report for 1960

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Introduction

The 1960 Progress Committee would first like to pay its own special tribute to the preceding Chairman, the late Lloyd Thompson, who enlarged and inspired the Committee over the past five years. His untimely passing occurred on December 24, 1960, and he will be greatly missed by his many friends on the Progress Committee, even those who knew him only by his friendly letters.

Mr. Thompson, in introducing the 1959 Progress Report, pointed out that it brought to a close an interesting decade of developments in the motion-picture and television fields, and looked forward to many new changes expected in the sixties. No startling new development has yet occurred, but rather a continuation during 1960 of the gradual technical improvements which have taken place in recent years.

The Nathan D. Golden Report[1] shows that 150 feature motion-picture productions were completed by U.S. companies in the first 11 months of 1960, which is down from 170 features for the same period of 1959. However, theater attendance was 44 million (estimated), up from 42 million in 1959, and box-office receipts were higher by 7.5%. The trend is thus for fewer, but larger feature pictures, usually resulting in longer runs at higher admission prices. The total number of theaters in operation in 1960 was 16,103 (including 4768 drive-ins), compared with 16,354 (including 4063 drive-ins) in 1958. Thus, the trend is toward more drive-ins but fewer indoor theaters. Throughout the world, the total number of theaters increased from 120,000 in 1955 to 155,000 in 1960.

There were 343 feature pictures in the Oscar race in 1960, of which 43% were in color, compared with 38% in color in 1959.[2] Those produced by U.S. companies represented 53% of the 343 total, as compared with 67% in 1959. This trend indicates the growing importance of productions abroad. Growth

Submitted January 27 to March 27, 1961, by John M. Calhoun, Committee Chairman, c/o Eastman Kodak Co., Manufacturing Experiments Div., Kodak Park, Rochester 4, N.Y. The Committee makes an annual report, this report covering the calendar year 1960.

Fig. 1. Lightweight, aluminum reflector (California Studios).

of the theatrical motion-picture industry during 1960, despite inroads of television, was specifically reported in both Italy[3] and France.[4]

New installations for showing Cinerama pictures in the United States brought the total to 11, compared with a total of 41 throughout the world.[5] A continued increase in theaters for viewing 70mm pictures was noted, the total for the United States and Canada now amounting to 194, including 5 drive-ins.[6]

Another noteworthy trend has been the increasing use of motion pictures for instrumentation and high-speed photography. This was highlighted by the Fifth International Congress on High-Speed Photography, sponsored by the SMPTE and held in Washington, D.C., October 1960. Increasing interest has also been evidenced in the use of motion pictures and television in space technology. These scientific applications are described in detail elsewhere in this report.

The use of 8mm film continued to expand during 1960 with the introduction of new equipment, including one sound camera using prestriped film and two sound projectors in the United States. Similar developments were reported abroad. The increasing importance of 8mm film in the professional field was evidenced by considerable activity in standards work in the Society's Engineering Committees.

The FCC Annual Report[7] shows that 88% of homes in the United States have one television receiver, and 11% have two. There are now 52 million receivers in the U.S. A shortage in Hollywood studio facilities developed, as a result of the increase in the number of television shows being produced, and the switch from half-hour to one-hour programs.[8] Continued progress is reported in color television. Pay-TV is still in the testing stage in several communities.

New technical developments are described in the individual reports which follow.

Set Construction

The most significant advances in set construction procedures at the Hollywood studios have taken the form of improvements in equipment facilities. Increased use of studio space and facilities for production released through television has brought about significant modification of views, policies and technical aspects concerning set construction. Shortened production schedules, concern for economy and the trend in favor of television series with permanent stage sets used over and over have strongly curbed funds formerly available for experimentation. On the other side, television production planning introduced many sound and constructive changes, such as mechanization of set construction. Standardization of set units and limiting of colors and grades of paints, lacquers and other set construction materials resulted in worthwhile savings without jeopardizing technical quality.

Fig. 2. "High-Low" scissors lift portable scaffold used by Warner Bros. and 20th Century-Fox.

Continued interest is being shown in the design of new set construction equipment that is lighter and labor-saving. An example of this is the new reflector used by the Grip Department at California Studios and by other studios (Fig. 1). The supporting board is made of impregnated plastic honeycomb covered with sheet aluminum. Because of its design and construction, the reflector offers one of the flattest reflecting surfaces produced thus far, essentially eliminating hot spots. The weight of the unit complete is less than one-half the ordinary studio reflector, thus reducing the labor required to handle it.

Another type of equipment that has proved to be helpful is the new portable scaffold, designed by Warner Brothers and 20th Century Fox, called "High-Low" lift (Fig. 2). The equipment operates on a scissors principle; a hydraulic lift, electrically controlled, moves the scaffold up and down between the floor and a maximum height of 22 ft. The lifting capacity is 900 lb. In addition to transporting limited loads, such as beams, ceiling flats, small platforms, the "High-Low" Lift has been found practical for carrying working personnel to any desired height of stage level.

Many of the studios are now employing fork lifts with special carriages for transporting lighting equipment and personnel from stage to stage (Fig. 3). This type of handling equipment has reduced set rigging costs appreciably by lessening the manpower required and speeding up set construction operations.

A relatively new type of equipment being used at many of the studios now to replace the old "A" frame boom truck is the Three Wheel Crane Kar (Fig. 4), which handles loads up to 5000 lb with one-man operation. The "stick" or boom arm is live and can be swung in a 180° arc, raised or lowered, and is very maneuverable. Heavy weights, such as parts of sets, trees, rocks, etc., can be moved in a minimum amount of time.

At Revue Studios a larger capacity crane, manufactured by Austin Weston Co., is being used. It is called "Full Swivel Extendo Boom" (Fig. 5). The

Fig. 3. Fork lift truck and carriage for transporting lighting equipment, used at Republic and Revue Studios.

truck has 4-wheel drive and steering, can move crab dolly fashion, maneuver the most difficult turns in confined areas — has 4-hydraulic out-rigging for very heavy lifting, and will carry a load up to 10 tons. The boom arm can be extended to a height of 35 ft and can turn a full 360°.

A new small compact wind machine has been developed by Mole-Richardson Co. for creating special wind effects in confined areas (Fig. 6). It furnishes maximum air flow with minimum noise and its air stream is directional with vanes or broad without vanes. The unit provides smooth variable speed over a wide range and will tilt and pan through 360°.

Film

In the early part of 1960, Eastman introduced High Contrast Positive Film, Types 5362 (35mm) and 7362 (16mm) which replaced the corresponding older product designated as Types 5363 and 7363. The new film provided improved definition and less image spread, these features being especially desirable for preparation of silhouette mattes used in process work. The film is also appropriate for making negative or positive titles, traveling mattes for printer light control and for other purposes where high contrast is desired.

At the Spring Convention of the Society, a new Eastman camera negative film was described.[9] This material, designated as Double-X Panchromatic Negative Flm, Types 5222 (35mm) and 7222 (16mm), represented a major advance in speed-granularity ratio over existing camera films. With exposure index values of 250 for daylight and 200 for tungsten, its granularity is only slightly greater than that of Plus-X Panchromatic Negative Film whose speed is less than half that of the new product. Acutance measurements showed that the new film also had the same ability to produce sharp images as the slower Plus-X Film. Another important characteristic of the new film is that its granularity does not increase as rapidly with increased exposure as certain other high-speed materials. Processing conditions for Double-X are comparable with those used for other Eastman camera negative films. It is expected that this new product will find wide application both in regular motion-picture production work and for television productions.

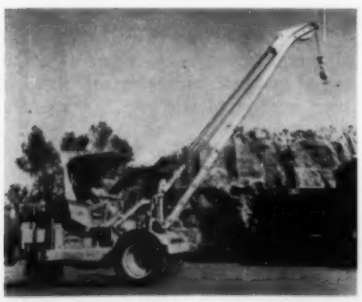

Fig. 4. Three-Wheel Crane Kar used at Republic and Warner Bros. Studios.

In the Progress Committee Report for 1959, two high-speed color reversal films, designated as Eastman (or Kodak) Ektachrome ER Film Daylight Type (Types 5257 and 7257) and Type B (Types 5258 and 7258) were described. Details concerning these films were presented at the Society's 1960 Spring Convention and later published.[10] At the same time, a new reversal color print film designed to serve as a companion to the camera films was also described. This film, designated as Ektachrome Reversal Print Film, Types 5386 and 7386, was designed so that it could be processed in the same solutions as those used for the camera films. This provided a complete color system for the user, wherein original camera films could be processed and high-quality color prints could be made immediately, thus eliminating inconvenience and delays in having prints made at other laboratories. This feature is especially attractive in military applications where immediacy of results and security problems are important considerations. The system should also be of interest to laboratories located in foreign countries.

Fig. 5. Full Swivel Extendo Boom used at Revue Studios.

During 1960, Du Pont introduced Type 140 High Contrast Fine Grain Negative Film. This material is especially intended for photographic applications where low brightness difference exists between object and background. It is particularly suited for photographing missiles, aircraft and other targets against a sky background. Since Type 140 is coated on "Cronar" polyester base, about 25% more film footage can be loaded in motion-picture cinetheodolites than when a similar emulsion coated on cellulose triacetate base is used.

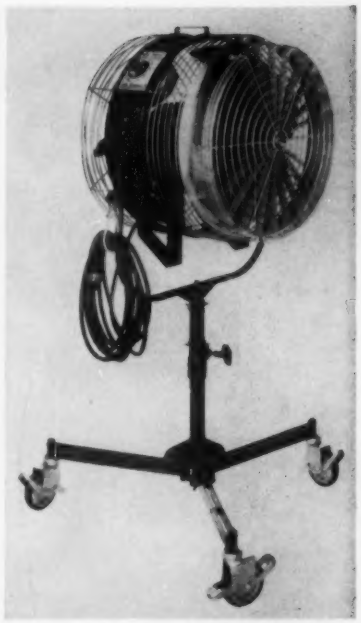

Fig. 6. Moleffect Windmachine, Type 1971, mounted on Type 19720 Pedestal.

Du Pont also converted a number of its regular motion-picture film types from triacetate to "Cronar" polyester base during 1960. These include Type 131 High Speed Rapid Processing Negative, Type 136 Fine Grain "Superior" 2, Type 228 Fine Grain Duplicating Positive and Type 225 Fine Grain Release Positive Films. The new support provides products which weigh less, occupy less space per foot of film and give greater dimensional stability than similar films coated on triacetate base.

Cinephonic Color Film, for use in the Fairchild Cinephonic 8mm Sound Camera, was introduced by Fairchild Camera and Instrument Corp. This is a reversal fine-grain color film of the Anscochrome type, with an exposure index of 12. It is prestriped in manufacturing with magnetic sound stripes, thus making it possible to record simultaneously pictures and sound. The film is manufactured by Ansco.

During the year Ansco introduced a new type Anscochrome Professional Camera Film, Type 242, and a companion, Anscochrome Duplicating Film, Type 244. These are reversal color films intended for the commercial and professional 16mm market. The camera film is a fine-grain, soft gradation film balanced for tungsten illumination with a film speed of 25. It is designed for printing on Anscochrome Duplicating Film, Type 244. The two films are compatible for processing. Thus, a laboratory can use the same equipment and solutions to process the camera's original footage and the prints using the minimum of equipment.

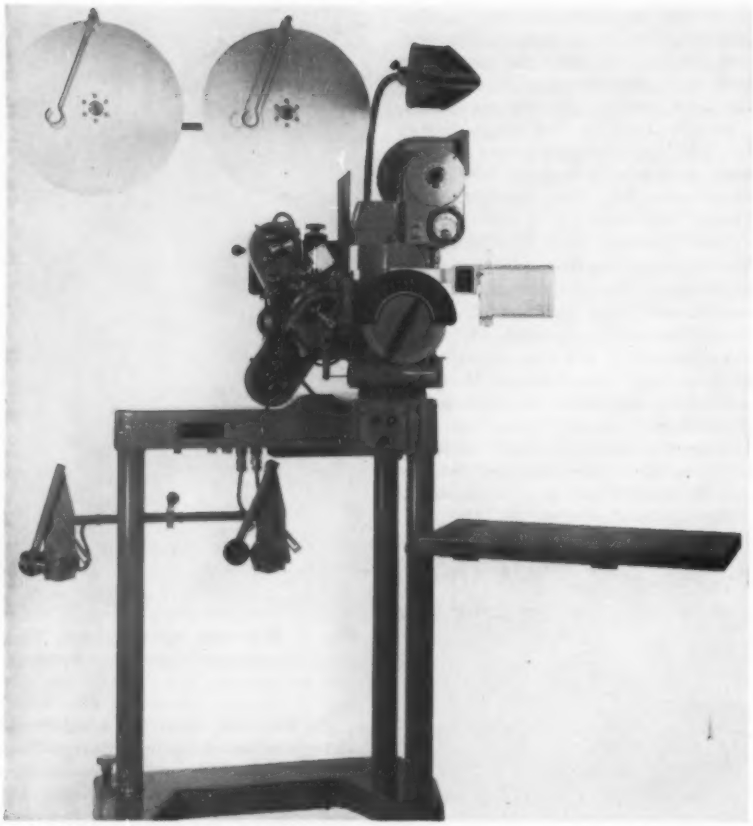

Fig. 7. Bell & Howell Model JM Printer.

For sports and news coverage, 16mm Super Hypan Negative Film was introduced by Ansco. This is a black-and-white fine-grain negative film with an exposure index of 500. It can be processed in any suitable negative developer to yield a gamma of 0.7 to 1.0. Positive prints can be made from the negative or the negative can be electronically reversed in telecasting.

A significant development in the 35mm color slide film field was the introduction of Anscochrome Reversal Duplicating Film, Type 544. This continues Ansco's trend toward processing compatibility between the camera and print or duplicating films. The gradation and color balance of the film are particularly suited to the production of film strips and slides. It can be processed by the regular Anscochrome process and yields duplicates which closely approximate the original in quality.

Laboratory Equipment

During 1960, Bell & Howell introduced a new series of 16mm printers (Fig. 7). Two models, the JM and JM-2 were delivered during the year. Differing radically from the previous model in appearance, the JM series utilizes a triplex base with all electrical components incorporated in a single distribution panel. The JM features a new main sprocket, a rotating "D" type aperture, a free wheeling shoulder support, and built-in edge light printing for footage numbers.

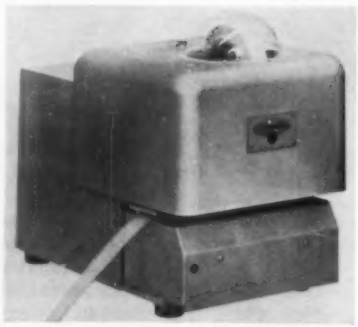

Fig. 8. Unicorn Automatic Film Splicer (Computer-Measurements Corp.).

Operator convenience and efficiency have been increased through the use of an internally illuminated shutter control dial. The JM-2 features an electrical footage counter and an electronic cue pulse lengthener to allow sufficient time for light changes to be completed at higher operating speeds. Using a new roller gate, better printing contact is maintained with a resultant noticeable increase in screen sharpness.

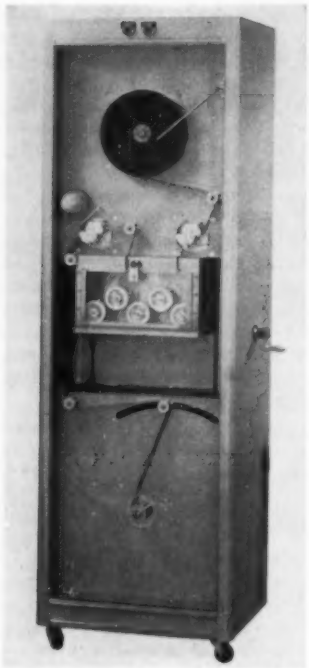

Fig. 9. Unicorn Magnetic Tape Cleaner, Model T-7070.

A new Unicorn automatic film splicer for darkroom splicing operations has been announced recently by Computer-Measurements Corp., Sylmar, Calif. (Fig. 8). Available in 16, 35 and 70 mm models, the Unicorn splicer produces unbreakable splices using pressure-sensitive Mylar tape. The automatic splicing operation is completed in only six seconds. An operator simply clamps the two film ends in the positioning channels and pushes a button. The result is a smooth splice with the adhesive splicing tape firmly rolled completely around the film, sealing corners and edges, guaranteeing free passage through processing machines, precision squeegees, applicators and slitters. Thin splicing tape assures flexible splices and film can be handled equally well with either friction-drive or sprocket-drive processing machines.

The new Unicorn magnetic tape cleaner designed for the automatic cleaning of magnetic recording tape has also been introduced (Fig. 9). It operates at high speed with complete safety. Speed is adjustable from 0 to 300 ft/min, with automatic shut-off that leaves the machine threaded with leader for continuous operation. The unit uses only nonflammable, nonexplosive solvents. Operation is completely automatic. Dirt, lint, oil, fingerprints and wax are removed with great efficiency without disturbing the information on the tape.

The cleaning action features special protection for valuable tapes by allowing only velvet cotton fibers to contact the tape surface. In addition, the solvent forms an effective fluid barrier between the scrubbing roller and the tape to prevent scratches or abrasions. Unicorn now is producing a 70mm Model of their film cleaning machine (Fig. 10).

Hollywood Film Company reports new 8mm, 16mm (Fig. 11) and 35mm film repair and splicing machines for perforated or unperforated film. These machines, which use unperforated Mylar tape for resisting solvents, perforate the tape to match the film perforations when necessary on the job. They shear the excess tape on both sides of the film at the same time. These machines can be used to repair torn sections of film and for butt splicing.

A 70mm film repair and splicing machine (Fig. 12) has also been introduced. This unit repairs a frame of 70mm film ($2\frac{1}{2}$-in. wide) with solvent-resistant Mylar tape. The tape is pulled over the frame to be spliced or repaired and then smoothly leveled with a roller unit. A punch and die action perforates ten 70mm perforations and shears the surplus tape.

Lipsner-Smith Corp. has completed developments on a 70mm CF-2 Ultrasonic Film Cleaning Machine and a Microfilm Film Cleaning Machine. Both of these units have now been made available for the industry as greatly improved equipment which facilitates the cleaning of 16mm and 35mm negatives.

Mecca Film Laboratories in New York and Byron Motion Pictures, Inc., in Washington, D.C., report the use of the Pako Corp. "Staticmaster" on all their printing machines and film loop trees. This unit eliminates reprints caused by dirt being picked up by static on the negative during the printing process. Color raw stock is also passed through a similar unit before printing to remove any emulsion dust on the film caused by slitting or perforating.

During 1960, the Calvin Productions, Inc., designed and built a 16mm-to-8mm continuous reduction printer. The purpose of this printer is to use existing 16mm negatives, both black-and-white and color, and by reduction printing achieve the best possible 8mm photographic quality. It was also decided that a continuous printer operating at 250 ft/min on the 16mm side would give both the quality advantages of reduction printing and the production speed required for release printing. The printer is constructed with both the 16mm and 8mm drive sprockets on the same shaft. The optical system has a U-shaped path between the two films. Full tooth sprockets are used to provide necessary film steadiness.

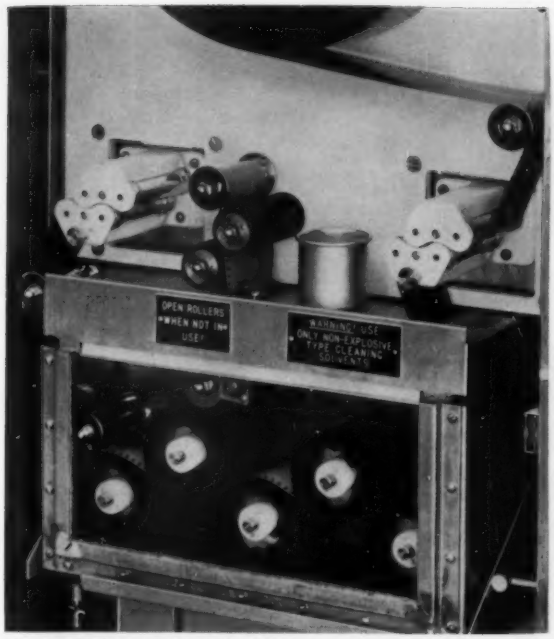

Fig. 10. Unicorn 70mm Film Cleaner.

Technicolor Corp. announced that Technirama 70 made its first theatrical appearance in 1960. This is a method of preparing 70mm unsqueezed prints from Technirama negative. The development called for the design of new cameras, lenses, film printers, processing machinery and projectors, and, also, wet printing equipment to achieve very high quality 70mm prints. The process has been used on several productions produced in England and on *Spartacus* in this country.

The George W. Colburn Laboratory has been a pioneer in the developing of specialized equipment and procedures for quantity 8mm sound printing. They report their best quality 8mm duplicates are made from 16mm film on an optical reduction printer.

Frank Herrnfeld Engineering Corp. reports the development of a microdensitometer for photographic research (Fig. 13). The unit has a resolving power of about 850 lines/mm when the scanning aperture is 1μ wide and 40 μ long. The response is linear down to 0.1% transmission for the same aperture. By narrowing the aperture, the resolving power can be increased to 2000 lines/mm. Visual readings can be taken on a self-contained meter or a recording can be made on chart paper with rectangular coordinates. For an optical system the microdensitometer utilizes a modified Zeiss Standard GFL microscope with inclined binocular phototube. This allows visual monitoring during recording.

Herrnfeld also introduced during 1960 a Constant-Time, Variable-Intensity Microsecond Exposure Sensitometer (Fig. 14). This sensitometer makes

Fig. 11. 16mm Film Repair and Splicing Machine (Hollywood Film Co.).

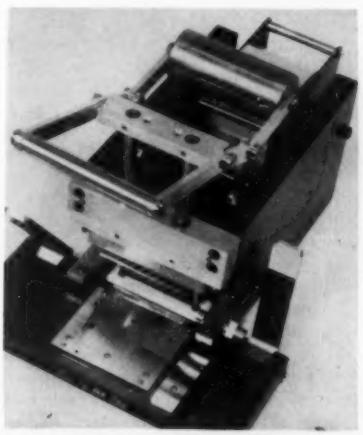

Fig. 12. 70mm Film Repair and Splicing Machine (Hollywood Film Co.).

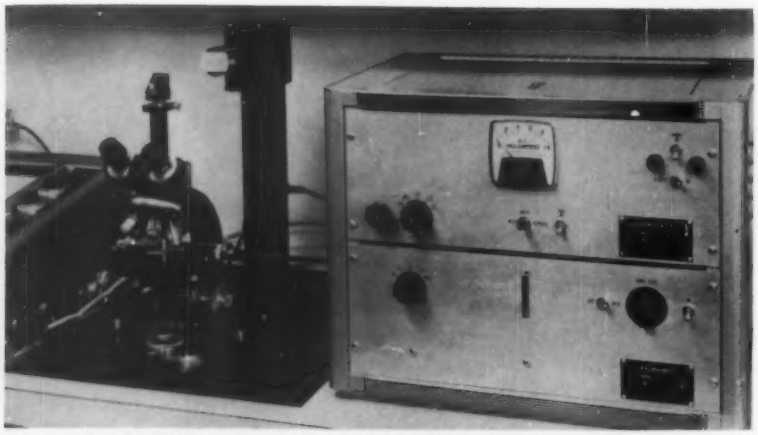

Fig. 13. Model 1558 Microdensitometer (Herrnfeld Engineering Corp.).

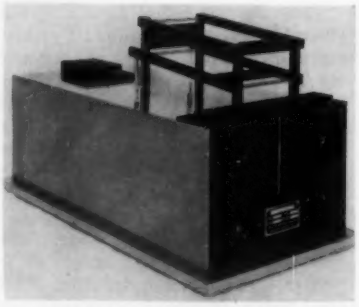

Fig. 14. Model 1571 Constant-Time Variable-Intensity Microsecond Exposure Sensitometer (Herrnfeld Engineering Corp.).

sensitometric strips for film investigation in the microsecond region. The instrument utilizes the Type 230 flashtube and is capable of giving an exposure of as low as 1.5-μsec duration. It features a straight platen which allows the operator to make an exposure in the center of a 22-in.-wide film or paper. The standard exposure aperture is 35 by 210 mm or 10 by 210 mm. A knob on the front panel gives the choice of three different exposure times, 1.5, 15, and 150 μsec. Provisions are made to introduce color filters. The Type 230 flashtube has an arc length of only about 3 mm. The shape of the arc is approximately spherical with a diameter of about 5 mm. To provide trigger energy and reliable flashing, a separate trigger electrode is applied. The color of the light is predominantly blue and therefore highly actinic.

Consolidated Film Industries designed, built and installed in their Fort Lee, N.J., laboratories a Multihead 35mm to 16mm Optical Reduction Printer. With one pass of the 35mm negative film, eight 16mm positive prints are simultaneously exposed. A feature of the printer is that all eight objective lenses which produce the positive images have a common optical axis from the 35mm head.

Processing Chemistry

Control Techniques in Film Processing, a book written by specialists in the field, edited by Walter I. Kisner, and published by SMPTE, contains sections on the chemistry of film processing, and on chemical analysis and control of black-and-white processing. It includes information on the purity requirements of chemicals, the mixing and storing of processing solutions, the effects of chemical variations in photographic processing solutions, the analytical equipment needed for control, and a comprehensive listing of literature references on analytical test methods. A method is described for determining the proper replenisher composition required to maintain the desired photographic aim.

In 1960 the American Standards Association revised twenty American Standards for photographic grade chemicals. A complete listing of more than seventy Specifications for Photographic Grade Chemicals is available, without charge, from the American Standards Association, 16 West 40th St., New York 16, N. Y.

Serious processing difficulties occurred in several laboratories in 1960 from the use of poor-quality sodium thiocyanate. The material did not pass the requirements for the photographic grade chemical, as established by the American Standard, although it met the National Formulary (N.F.) requirements and also met the reagent chemical requirements.

Lloyd E. West reported[11] on the quality of water for photographic processing. The author describes the effects of water hardness, suspended matter, chlorine, chloride, algae, pH, copper, iron, sulfide, and other impurities. An American Standard for a method of determining the hardness of water has been approved.

An American Standard currently being revised is a method of testing the suitability of metallic and plastic processing construction materials for use in processing equipment.

A U.S. Patent[12] was issued for the use of persulfate to regenerate used ferricyanide bleaches.

G. F. VanVeelen and H. Ruyschraert[13] report that in a developer containing 1-phenyl-3-pyrazolidone, hydroquinone, hydroquinone monosulfonate and sulfite that the 1-phenyl-3-pyrazolidone is regenerated almost quantitatively by air oxidation.

At the Society's 1960 Spring Convention Robert M. Grubel and Carl W. Hauge reported an automatic developer solution replenisher rate control by infrared cuing. The stability of the developing solution was also discussed.

H. Ulrich and H. Schueler[14] report that para-amino derivatives of 1-phenyl-3-aminopyrazoline, with hydroquinone, show a developing action with pronounced superadditivity. Developer systems containing those derivatives had a shorter induction period than those containing 1-phenyl-3-pyrazolidone.

Thiourea and its derivatives have been described by Brunner[15] in their application to photographic stabilization processing. These compounds have been used to convert undeveloped silver halide into a complex compound that is not light sensitive, is transparent, and can be left in the gelatin without ill effects on the image quality. The process has been used to eliminate washing in special cases. However, increased clearing time may be required for the film.

C. I. Pope[16] found that a small amount of potassium iodide added to the fixing bath was effective in preventing most of the sulfiding of the silver image during fixation. He also reported a procedure for testing the effectiveness of a hypo eliminator.

Magnetic Sound Recording Media

Several companies entered the magnetic tape industry during 1960. RCA opened its plant at Indianapolis, Ind., and is presently producing audio tape for professional, commercial and home recording use. Sarkes Tarizan entered the industry with a ¼-in. professional-quality magnetic tape on 1½-mil acetate base[17]. Eastman Kodak's first offering was a ¼-in. audible-range tape on their triacetate base. Burgess Battery completed this list with the introduction of seven audible-range tapes, four on acetate and three on polyester base.

In Costa Mesa, Calif., Greentree Electronics acquired the assets of American Recording Tape Corp. and has expanded their product lines with the introduction of a higher output and lower print tape.

The Minnesota Mining and Manufacturing Co. added a completely new line of audible-range recording tape to complement its Scotch Brand line. This new

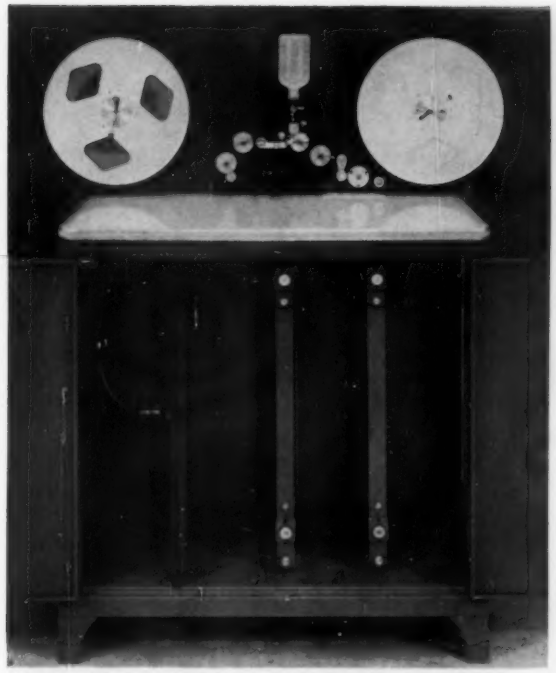

Fig. 15. Magnetic Striping Machine for 8mm Film (Reeves Soundcraft Corp.).

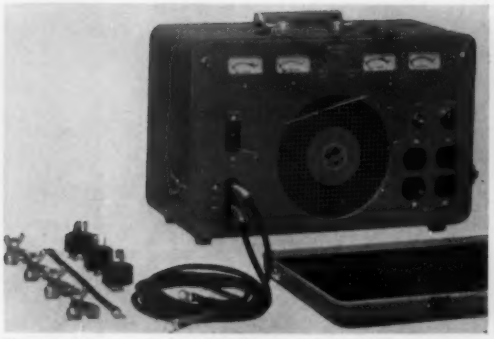

Fig. 16. Westrex RA-1629-A Transistorized Inverter.

Fig. 17. RCA Portable Magnetic Recording System Model PM-72.

Tartan series offers a 1-mil and a 1½-mil acetate tape along with a ½-mil and a 1-mil polyester base tape. Due to the recent upsurge in the use of magnetic tape in schools and language labs, the 3M Company also introduced a tape designed especially for this application. Called Tenzar, this tape has 3M's exclusive backing which is relatively nonsensitive to temperature and humidity when compared to conventional acetate backing. It also exhibits extreme resistance to tear and stretch; it resists tearing even if the edges become nicked. A new 35mm magnetic film (#335) with superior wear characteristics and very low rub-off was also introduced during 1960.

Reeves Soundcraft Corp. completed the design and introduced its new single 8mm striping machine (Fig. 15). This is a small, completely self-contained unit, designed to lay down a stripe of magnetic oxide at a speed of 25 ft/min on developed 8mm film.

Although several of the major tape manufacturers were reported to have manufactured video tape on a sampling and evaluation basis, the 3M Company continued to be the sole supplier of a commercially acceptable video tape.

Sound Recording

A major trend in motion-picture sound recording has been toward solid state electronics. Several equipment manufacturers have announced new transistorized components as well as entire systems, and various studios have developed specialized transistor units. The savings in space and weight are of particular significance in location work.

A solid state 12-v to 120-v power converter capable of operating a camera and sound recorder from storage batteries was developed by M-G-M Studios. Another portable, battery-powered, transistorized power supply of unique design was introduced by Westrex Corp.[18] This RA-1629-type Inverter (Fig. 16) can also be used for any other application requiring a 115-v, 50- or 60-cps, sine-wave power source with stable voltage and frequency characteristics. The unit operates from a 12-cell, 24-v lead acid battery or two 12-v automobile batteries in series. These power sources are valuable in location work.

A solid state background noise level controller is being used and further developed by Columbia Studio Sound Dept. The unit was developed as an aid in the re-recording operation to control the level of undesirable recorded background signals as, for example, airplane or traffic noise.

A new item in the RCA sound recording line, the PM-72 Portable Magnetic Recording System,[19] used a transistorized mixer containing two microphone amplifiers, a recording amplifier, a monitor amplifier and a line-up oscillator (Fig. 17). A transistorized compressor amplifier designed for use with the mixer, uses silicon diodes as the control elements.

Westrex has introduced a new transistorized mixer providing up to eight channels in a modular design.[20] An amplifier-oscillator module contains the master volume control, a test-tone oscillator and tableback microphone. Monitoring and metering facilities are provided and an optional transistorized recording amplifier may be used.

The trend toward compactness is illustrated by a multi-unit re-recorder introduced by Westrex.[21] Up to four magnetic reproducing units are mounted in one cabinet for handling 35mm, 17½mm or 16mm film at speeds of 90, 45 or 36 ft/min (Fig. 18). If desired, one unit may be equipped for magnetic recording and another for optical reproduction. Although all film-pulling mechanisms are driven by a common motor, any unit can be mechanically disconnected for fast forward or rewind operation, since each is provided with separate torque motors and brakes.

A new technique of post-synchronous recording that relieves the actor from much of the burden of maintaining synchronization has been described.[22] An essential part of the technique is a recorder that brings the tape up to operating speed in milliseconds in response to voice-operated controls. Techniques of providing a choice of four languages in small-theater reproduction have been described.[23–25]

Means of synchronizing the movement of a television tape with that of a per-

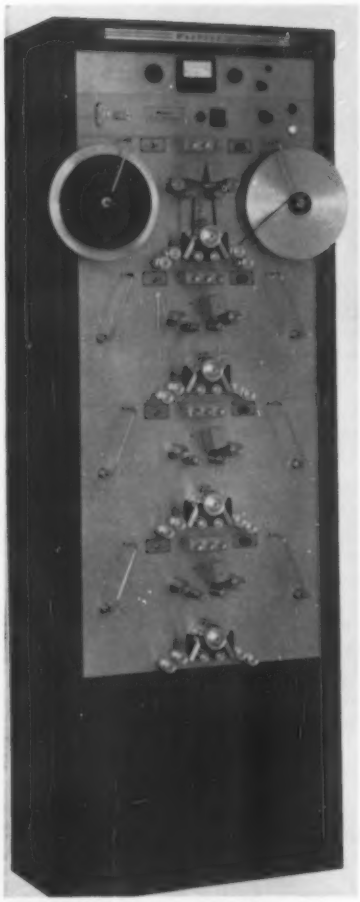

Fig. 18. Westrex RA-1621 Multiple Unit Re-Recorder.

Fig. 19. Datasync DRC-12A Recording Camera and associated equipment (Bach Auricon, Inc.)

Fig. 20. Nomad Double-System Magnetic Film Recorder (Magnasync Corp.).

forated film from a standing start to normal operating speed (and vice versa) are provided by a new Synchronizing Kit by RCA. The capstan motor is coupled to an interlock motor through a magnetic clutch. Thus, the capstan may be interlocked to a film machine while accelerating or decelerating. When normal speed is reached, the clutch is de-energized and both machines run independently at synchronous speed.

A new system of sound handling, editing and dubbing for video tape has been introduced by Ryder Sound Services, Inc. In this process, a normally recorded video tape is subsequently recorded with an audio code on the cue track. This code accompanies all sound or picture transfers. The Ryder Re-Synchronizer uses the coded information to obtain start synchronization on all tapes. The Re-Synchronizer is also adaptable to synchronizing 8, 16, or 35mm projectors with $\frac{1}{4}$-in. tape recorders.

The Datasync System of synchronized picture and sound was introduced by Bach Auricon, Inc. A prestriped 16mm film is used in this system. As many as five sound channels and two pictures can be recorded. A Filmagnetic three-channel playback head assembly that mounts on a modified projector is available (Fig. 19).

Magnasync Corp. introduced a double-system magnetic recorder known as the Nomad.[26] The Nomad uses split 16mm magnetic film on a 3-mil Mylar base and may be used as a double-system recorder or mechanically interlocked with cameras such as the Arriflex, Bolex, Cine-Special and others (Fig. 20). Also introduced by Magnasync Corp. was their Model 1016 professional recorder, a high-quality mechanical transport featuring a modified tight loop drive system using dual capstan to insure proper tape contact with the head. This machine is available for recording one to sixteen channels on tape ranging from $\frac{1}{4}$ in. to 1 in. (Fig. 21).

A new PM-76 Recorder/Reproducer was added to the RCA Film Recording product line in 1960. It employs a number of design improvements, notably a new film-drive mechanism which has been simplified in construction and rearranged to include other components previously relegated to other subassemblies (Fig. 22). Stancil-Hoffman Corp. developed a portable sound recording system by which a standard camera and a standard dual-track recorder are electrically connected to provide lip-sync recording. Reproduction may be either from the double system or from the magnetically striped transfer print. This system is applicable to any width of film. It was described at the 1960 Spring Convention of the Society.[27]

A compact, professional quality, multi-unit re-recorder, coded RA-1621-type, was introduced by Westrex Corpora-

tion. Up to four magnetic reproducing units are mounted in one cabinet for handling 35mm, 17½mm or 16mm film at speeds of 90, 45 or 36 ft/min. If desired, one of these units may be equipped for magnetic recording and another for optical reproduction.

Sound on 8mm film has become a reality with the announcements by Fairchild Camera and Instrument Corp.[28] and by Eastman Kodak[29] of 8mm projectors equipped for magnetically striped film. Fairchild also has a camera for 8mm prestriped film (Fig. 36). Engineering Committees are actively working on standards to meet the needs of this new development.

Editing

A soundhead mounting attachment for the "20 Series" Moviola cabinet has been developed for those editing operations requiring an additional soundtrack in sync (Fig. 23). Provisions are made for plugging into the existing Moviola amplifier with separate magnetic volume control over each soundhead. A new conversion kit applied to any 16mm or 35mm Moviola soundhead makes it possible for the operator to pinpoint sound effects, music notes, and dialogue more rapidly (Fig. 24). A twist of a knob puts the sound sprocket to "freewheeling" so that the track can be moved by the pickup head in "search" of the desired sound. Once the spot on the track is located, a twist of the knob once again locks the soundtrack in precise sync with the picture, and the Moviola operates in the normal manner.

A low-cost attachment that doubles the area of the standard 3 by 4-in. viewing screen has been developed by Moviola to alleviate eye strain caused by difficult-to-read action shots (Fig. 25). The new screen fits on any "20 Series" 35mm Moviola and can be installed in a few minutes time by the inexperienced mechanic using no more than a screwdriver. If after installing the large screen,

Fig. 21. Professional Recorder, Model 1016 (Magnasync Corp.).

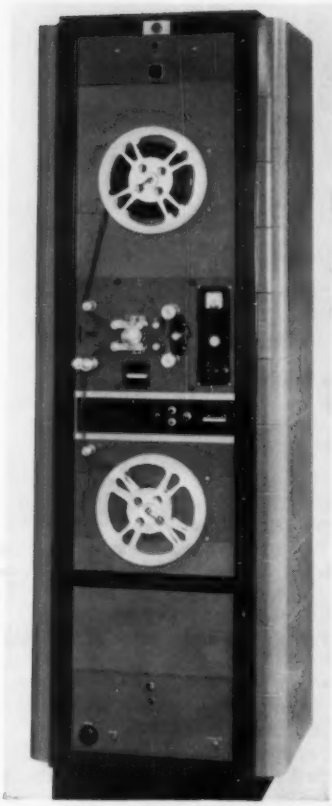

Fig. 22. RCA PM-76 Recorder/Reproducer.

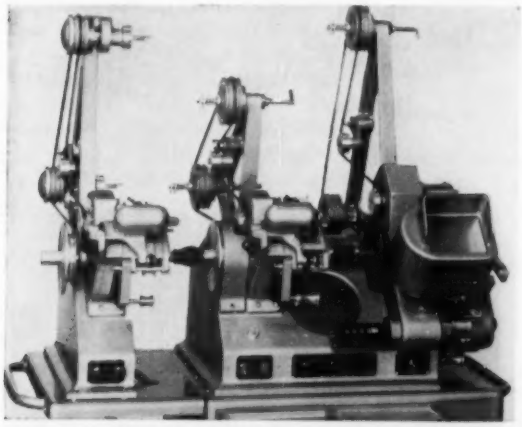

Fig. 23. Moviola cabinet extension for additional soundhead.

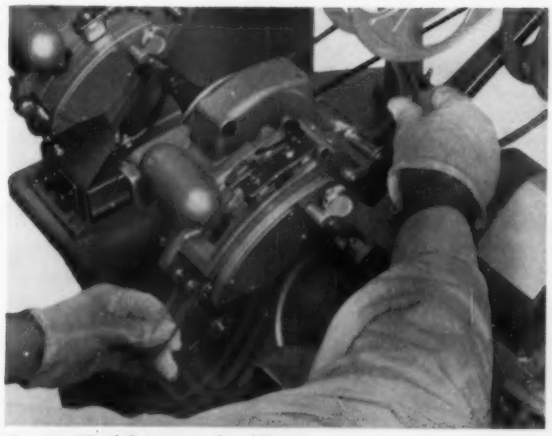

Fig. 24. Moviola conversion kit.

Fig. 25. Moviola large screen adaptation.

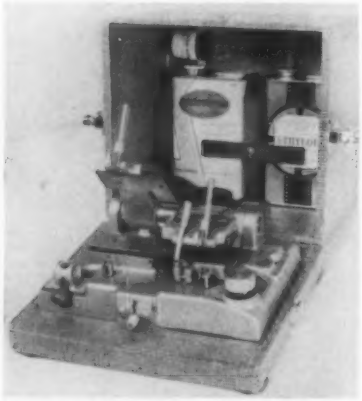

Fig. 26. 16mm table model hot splicer (Hollywood Film Co.).

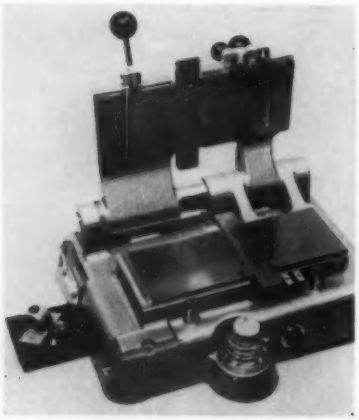

Fig. 27. 65–70mm table model hot splicer (Hollywood Film Co.).

the standard screen is desired for normal editing operations, it can be replaced by means of thumbscrews.

Two new hot splicers have been developed by the Hollywood Film Company, one for 16mm film (Fig. 26) and one for 65–70mm film (Fig. 27).

Perhaps the most important achievement in the editing field in 1960 has been the ability to see a "frozen" frame of video tape. This was accomplished by an invention of John D. Silva for Paramount Television Productions Inc., named the "TVola." It makes possible frame-by-frame editing of video tape. The system utilizes four 5-in. direct-view storage tubes manufactured by Hughes Products. The function of these tubes is to "freeze" or hold a single television frame on each of their faceplates and retain the images for as long as fifteen minutes, although they may be erased at will. Special timing circuitry automatically sequences the storage of pictures when that portion of the video tape desired to be edited is played back. The equipment records information on the cue track of the video tape to accomplish consistent timing and also marks the exact spot, to the frame, that the tape is to be edited and spliced. The operation works as follows:

The editor plays the section of the video tape where the desired splice or cut is to be made. An instant before reaching this point a START button on the TVola is pressed. This places a 1000-cycle start "beep" on the cue track coincident with the first vertical sync pulse read out of the video tape after the button is pressed. Coincident with the start "beep," one television frame is stored on monitor No. 1. The 30th frame is next stored on monitor No. 2, the 60th frame on monitor No. 3 and the 90th frame on monitor No. 4. The edit point lies somewhere within the 90 frames encompassed by the four images. The editor may, in many cases, decide to cut and splice at a point between any two of the four monitored pictures, i.e., between images three and four.

If it is decided that a more exact point should be ascertained, he may rewind the tape somewhat ahead of the start "beep," erase the first four images on the monitors and proceed with the second operation. Special buttons enable him to select which two pictures (30 frames) he wishes to sequence. In this second operation the monitors record frames 1, 10, 20 and 30 of the previously selected portion of the tape. In cases where the editor wishes to pinpoint further, he again selects a point between two of the four "frozen" images, erases, rewinds and passes the start "beep." This time the monitors record frames 1, 4, 7 and 10 of the selected portion. If absolute, perfect timing or cutting is desired, the monitors are erased and the video tape again rerun, beginning ahead of the start "beep." This time it will record frames 1, 2, 3 and 4 of the point previously selected and the exact frame for the splice is revealed. The monitor displaying this image is erased, the machine again rewound to the start ahead of the start "beep" and the video tape replaced. The timing circuitry counts and selects this exact frame and at this point a 400-cycle edit "beep" is recorded on the cue track, simultaneously with the appearance of the exact frame on the monitor previously erased. The tape is wound back to where the 400-cycle "beep" can be heard. This point is then marked on the back of the video tape lying under the video head. The video tape is then developed to locate the edit pulse corresponding to this mark. The splicing of the tape is then accomplished by conventional means.

The TVola is completely handled by pushbuttons and will accommodate either right- or lefthanded operation. An experienced editor can locate the exact edit point in approximately 45 sec.

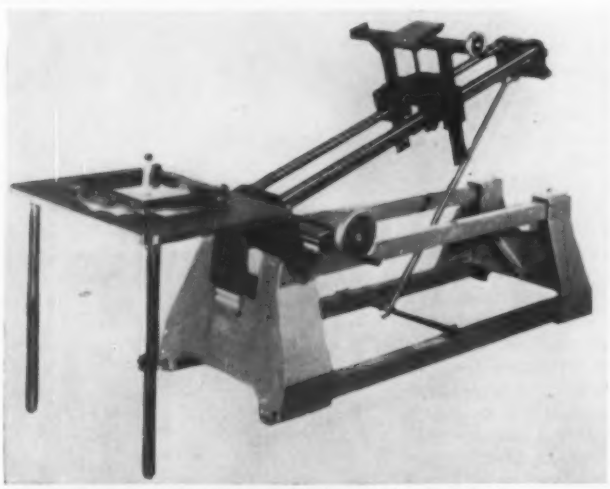

Fig. 28. Portman animation stand (Photo Animation, Inc.).

Fig. 29. Animation stand with special effects accessories (Photo Animation, Inc.).

Animation

Although nothing really new has appeared in the field of animation during 1960, a continual improvement is noted in the general quality and precision of the newer equipment and accessories.

A small, precise, but inexpensive camera stand was introduced by Photo-Animation Inc. (Fig. 28). This versatile stand enables the small producer to have available in one piece of equipment, a normal vertical animation stand, a horizontal title stand and a tilting crane for table top or miniature photography. This company also continues their well-known line of large animation stands complete with a variety of special effects accessories (Fig. 29).

The Animation Equipment Corp.'s Aerial Image Projector (Fig. 30), introduced two years ago, has been further improved and augmented with numerous special devices to permit distortion glass effects, wipes, flips, split image prisms, mechanical and film mattes. It is reported that this unit greatly reduces the time and costs of producing combination films and many special effects.

In line with the modern requirement of several film sizes, Richardson-Bowlds, Inc., introduced a novel animation camera featuring interchangeable film transports for 16, 35 and 70mm photography (Fig. 31). This precision camera has pin registration, automatic and manual dissolves, optical rotation of camera body, reflex viewing, film magazines or cassettes. The company also announced the Richardson-Bowlds camera stand model RB-300 (Fig. 32), a compact, modern crane featuring conveniently placed electrical controls, interchangeable 12-field and 16-field platens and a special Argon Cold Light backlighting system said to penetrate up to 9 sets of animation papers.

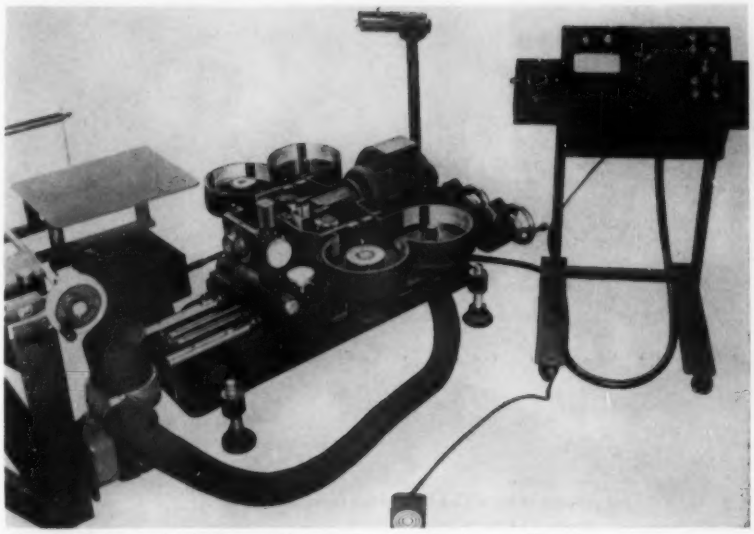

Fig. 30. Oxberry Aerial Image Unit (Animation Equipment Corp.).

Optical Development

Twenty-six new types of optical glass designed by the Schott Glass Works have been announced by their distributor, Fish-Schurman. Most of these new glasses are reported to have extremely high refractive indexes and low dispersion values, with little, if any, inherent color.[30]

The new and rapidly developing field of fiber optics — the technology of

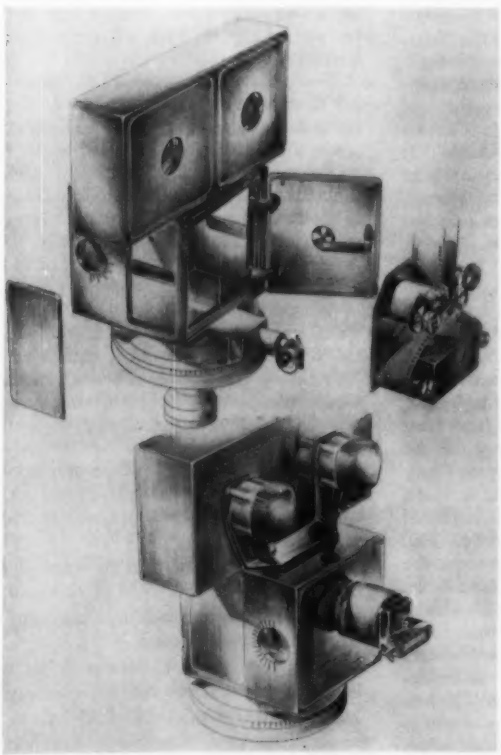

Fig. 31. Animation camera, Model R-500 (Richardson-Bowlds, Inc.).

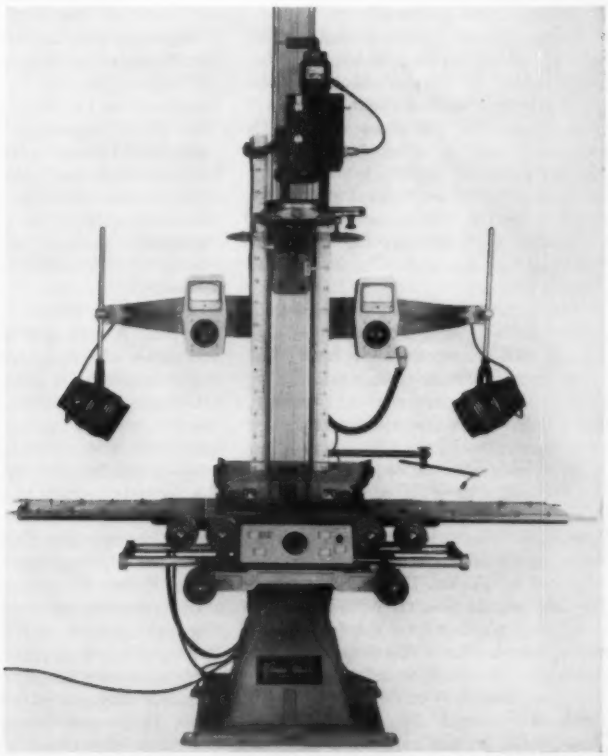

Fig. 32. Animation stand, Model RB-300 (Richardson-Bowlds, Inc.).

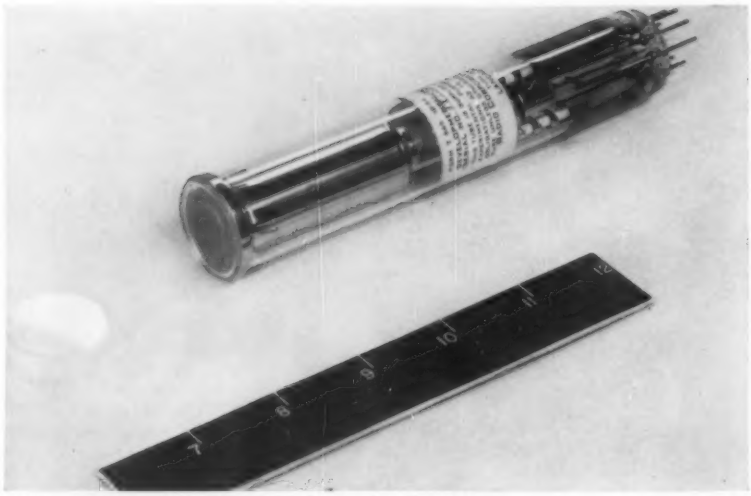

Fig. 33. Vidicon picture tube with fiber optics faceplate.

transmitting a light image from one location to another, element by element, has been described by Krolak, Siegmund and Neuhauser[31] (Fig. 33). Fiber optic bundles consist of many thousands of fine glass fibers less than 0.002 in. in size. These bundles, either in the form of solid blocks or flexible assemblies, can be used to solve a variety of difficult and unusual problems. They can be used in bundles containing up to 10,000 fibers in closed-circuit TV systems for dental and medical instruction, a use announced by Avco.[32]

The reasons for the unsuitability of resolving power as a criterion of the performance of an optical or photographic system were outlined by Perrin.[33] The concept of sine-wave response is explained, and it is shown how this characteristic is useful in describing the behavior of an optical or photographic system. The use of a single parameter such as resolving power or passband frequency may be inadequate for this purpose.

The terminology and principles of zoom optics were described by Kingslake.[34] Only recently have varifocal lenses comparable in quality to ordinary cine lenses become available. However, the activity in this field by virtually every manufacturer of lenses is resulting in systems of performance characteristics far exceeding those of earlier years. A prime example of this is the versatile new zoom lens with an extremely wide zoom range (2 in. through 40 in.) introduced by Taylor, Taylor & Hobson.[35] (See also report from Great Britain.)

A close-up adapter for the Super Universal Zoomar Lens has been designed especially for television tape as well as live commercials.[36] Another converter, newly announced by the Television Zoomar Co. for this lens, has a range of 12 in. through 72 in. and is used for news photography and sports events.[37]

A variable-focus lens with a range of 20mm through 80mm was announced by Traid. This lens, which will fit any "C" mount 16mm camera, is $4\frac{1}{2}$ in. long and 2 in. in diameter. The aperture is constant at all focal lengths, $f/2.5$ max, and the lens is focusable from 4 ft to infinity.[38] A fast zoom lens for the Arri-16, the Pan Cinor 85, was announced by the Arriflex Corp. This 17.5mm through 85mm $f/2$ lens is lever-operated and can be focused down to 6 ft.[39] Also available for the Arri-16 as well as the Arri-35 is the new Angenieux 140 Varifocal lens. The maximum aperture of this 35mm through 140mm objective is $f/3.5$.[40] A new motor-drive for the zoom movement of the 17–70 Angenieux zoom lens fitting the Arri-16 was also introduced. It consists of a miniature motor and gear mechanism which is mounted directly on the lens barrel by means of a special split-ring clamp. The control head is designed to mount on the panhead handle.[41]

Keystone, DeJur, Kodak, Bell & Howell, Revere and most other manufacturers of 8mm cameras introduced new models with integral zoom lenses. A variety of lens types, zoom range, speed and finder systems has been utilized. The wide acceptance of the equipment has been a significant factor in the development of the zoom lens and has virtually eliminated the traditional uni-focus cine lens from the 8mm field. For the "D" mount 8mm camera the Pan Cinor 40 was made available. This 5:1 zoom lens, 8mm through 40mm, has an aperture of $f/1.9$. Framing and viewing through its through-the-lens reflex viewing system is said to be extremely easy and parallax-free. The lens may be focused from infinity down to $3\frac{1}{2}$ ft, or even closer with the aid of an auxiliary Series VI close-up lens.[42] The new Camex Reflex 8 was announced by Karl Heitz. This camera can be used with interchangeable lenses from $6\frac{1}{4}$mm up to 145mm and with close-up attachments focusing down to 1 in. It features continuous through-the-lens viewing and focusing.[43]

A new $f/4$ Auto-Nikkor telephoto zoom coupling with the automatic diaphragm system of the Nikon F 35mm camera was announced. This 85mm medium telephoto to 250mm telephoto objective is said to exhibit the same high resolution and color correction as the more conventional non-zoom Nikon objectives. Focusing is from 7 ft to infinity.[44]

Among the numerous 8mm projectors introduced including such advances as magnetic sound, zoom lenses, slow-motion and other features was the Bolex 18-5. The projector, featuring super-slow motion, is equipped with a switch to drop the speed from 18 to 5 frames/sec. A variable shutter is said to eliminate flicker, burning and drying of the film at the speed of 5 frames/sec.[45]

A line of projection lenses for 8mm and 16mm projectors was developed and manufactured by Dallmeyer of England. These lenses, ranging in length from 20mm to 102mm are available in a variety of some two dozen mounts.[46] An anamorphic lens that will convert any 16mm projector for showing CinemaScope format films was announced by Victor Animatograph. Called Victorscope, this new lens may also be used as a supplementary camera lens for photographing in the CinemaScope format.[47]

Two $f/1.9$ lenses (25mm and 50mm) for 16mm and vidicon cameras were described by Kodak. These six-element lenses are transmission matched so that the change from one to the other does not appreciably change the color balance of the image. Both the 25mm and 50mm lenses are available in S mount or C mount and can be focused from 12 in. and 24 in., respectively, to infinity.[48]

A breakthrough in the field of high-speed lenses has been reported in Japan by Shotoro Yoshido of the Science Laboratory in Sendai. The successful design of a 50mm $f/0.519$ has been executed utilizing a five-element design incorporating one aspheric surface. Although not presently in mass production this lens offers considerable interest for special purpose professional and scientific photography.[49]

Traid now has available an unusually small lens with a 180° field of view and extremely high resolution. Designated No. 735 this wide-angle lens is available in an Eyemo mount. It has a focal length of only 6.51mm and the relatively high speed of $f/6.3$.[50] Karl Heitz announced a new Kinoptik wide-angle lens for 16mm motion-picture and television cameras. This $f/1.8$ lens, capable

of 133° coverage, features a built-in slot for 2-in.-square filters and a rectangular lens hood.[51]

Numerous telephoto lenses were introduced including the Pantel series of professional telephoto lenses announced by Traid. These lenses, which range in focal length from 4 in. through 24 in., may be used on 16, 35 and 70mm cameras.[52] The Telefold lens designed to offer a long focal length system in a short, lightweight package has been announced by Atlantic Research. It uses a catadioptric system which permits its 42-in. focal length to be folded in a 10-in. tube that can be focused from 2 ft. to infinity.[53]

The new 20-in. *f*/4 Zoomar Reflector is adaptable to all types of 16mm and 35mm motion-picture and TV cameras. It has been designed for high resolution, compactness and light weight. The distance from the front of this 7-lb lens to the film plane is 14 in. and the maximum outside diameter is 6¼ in.[54]

Bausch & Lomb announced a new series of Super Baltar lenses designed for motion-picture, television and special purpose applications (Fig. 34). Made from new glasses of high index, these lenses are said to have excellent resolution characteristics and the most even distribution of illumination ever offered in a motion-picture camera lens. The new series includes a choice of eight lenses, with focal lengths ranging from 20mm to 9 in. All lenses are calibrated in the *f*/ and T-aperture system and are of *f*/2 aperture except the 6 in. and 9 in. which are *f*/2.8 and *f*/4 respectively. All focal lengths cover the 35mm motion-picture format; lenses of focal lengths of 3 in. and greater include the 70mm format.[55]

A new version of the super-Farron lens, called the Backward Curving Field Super-Farron, has been announced by Farrand Optical Co. It is designed for use with types of high-amplification image intensifiers and intensifier orthicons having curved cathodes. The lens forms an image on a focal surface which is convex to the objective and has a radius of curvature of 4 in. The new lens is available corrected for infinity, or for 16:1 or 4:1 conjugates.[56] Also, the Navitar, a 6 in. *f*/1.9 lens for high-resolution one-to-one cathode-ray-tube photography was announced by Elgeet. The lens has been designed to work in the 4200–6000 A, with the corrections peaked at 4300 A. It covers a diagonal of 4.5 in.[57]

A portable field collimator for checking long-range lenses and cameras has been developed by Zoomar Inc. The instrument measures 10 in. in height; 6½ in. in width; 30 in. in length and weighs 25 lb. The design is based upon the premise that a collimator objective need not have a focal length longer than the lens under test if the collimator is corrected over a considerable extra-paraxial field.[58]

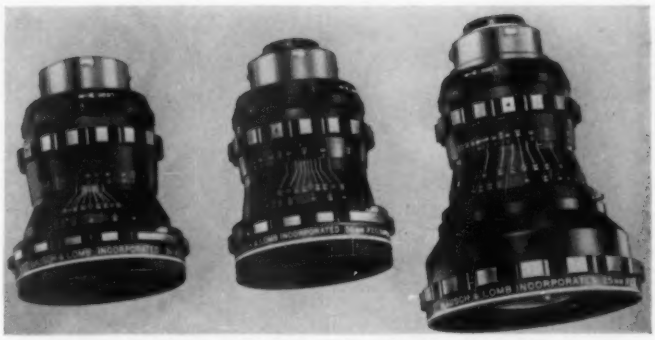

Fig. 34. Super Baltar Lenses (Bausch & Lomb).

The Mason Instrument Co. announced an optical lens bench for testing lens alignment, color correction, astigmatism and other aberrations. It includes two end supports carrying two steel bars spaced 4 in. apart, and a third bar below. Kinematic design is said to make for easy and accurate alignment.[59] A new line of Kerr cell electrooptical shutters capable of operating in the $\frac{1}{100}$ millionth sec range has been introduced by Electro-Optical Instruments. The Kerr cell is composed of two flat plates, or electrodes, immersed in a fluid which becomes birefringent upon the application of an electrical field. When such a cell is oriented between two polarizers crossed for minimum transmission the arrangement constitutes an optical shutter.[60]

Theater Equipment

There has been a steady but slow increase in the quality of motion-picture projection in the indoor theaters. Also, in the past year, a new spurt of activity in new motion-picture theater construction has evidenced itself. At least 15 new theaters were built in the United States, mostly in the new large shopping centers. And, according to present plans, it would seem that at least this number of new theaters can be expected to be built in 1961. A great amount of remodeling of existing motion-picture theaters has also taken place, with new equipment and screens being installed at the same time.

The improvement of lamphouses, giving more and better screen illumination, has led to an almost complete changeover to the pearlescent, comparatively low-gain type of projection screens, with little or no high-gain aluminum-type screens being used. There have also been many screen installations, especially in new theaters in which the problem of the various aspect ratios was reduced to the adoption of just two shapes. One of these serves in both size and shape for CinemaScope and 70mm prints using any aspect ratio from 2.2 to 1. The second format uses the same physical picture height for standard cropped 35mm film, leaving only unused side areas of screen material. In many cases, in new theaters this has permitted the complete elimination of screen maskings and curtains, allowing the unused side screen areas to be exposed to the audience. The latter condition is especially acceptable in appearance when the walls and ceiling leading to the screen become part of the framing effect of the screen. These surfaces contiguous to the screen are made to appear in color and light very much the same as the unused screen surfaces, giving a restful and pleasant picture surround effect. This treatment recalls the effect of the RCA Synchro-Screen used about ten years ago, but differs in that it is now built as part of the structure.

The aperture plates in the projectors have to be specially filed to make it possible to achieve this amount of uniformity in picture format. Very minor picture information is sacrified in this attempt towards simplification of the problem. The maximum picture widths seem to be 2 *W* to 2½ *W* which is in terms of maximum viewing distance divided by picture width.

There are now about 200 installations of 70mm projectors in indoor theaters in the United States of both local and foreign manufacture. Only about eight of these are installed in drive-in theaters. It is worthy of note that the portion of the seating pattern nearest the screen changes from an undesirable seating area to a most valuable seating area when 70mm film is projected, because of the marked improvement in picture resolution.

Many motion-picture theaters have been reseated with a decided reduction in capacity to affect more comfortable spacing and seat sizes and to improve viewing angles and distances, all consistent with the newer demands for visual and other physical comforts and the amount of patronage required for business reasons.

Fig. 35. Paraflex 65, handheld 65mm camera (Panavision, Inc.).

Wide-Screen and New Processes

During 1960 no new generally accepted process in wide screen was developed. The use of 70mm presentation increased and many additional projection installations were made throughout the world. Motion pictures released in 70mm during 1960 were: *Porgy And Bess*, *The Alamo*, *Spartacus*, and *Exodus*.

Paramount Studios began shooting their motion pictures in Panavision 35mm. Panavision, Inc., announced the production of the Panaflex 65mm handheld motion-picture camera (Fig. 35). Weighing 24 pounds, the camera has a dual register pin movement, and carries a 500-ft film magazine, tachometer, and parallax correcting optical viewfinder as an accessory.

Nontheatrical Films

New equipments and processes introduced during 1960 made this a noteworthy year for the audio-visual and nontheatrical film fields. Two domestically-manufactured 8mm sound projector models were introduced in addition to those previously announced in Europe. A new type of sound filmstrip projector was also announced. Teaching machines were made available for school use in 1960.

A breakdown of total audio-visual expenditures shows that during 1960 educational institutions spent 32% more than in 1959, reaching an estimated total of $103 million; business and industry spent $184 million; federal, state and local governments, $59 million; religion, $18 million; civic, social welfare, and recreational organizations, $16 million; medicine, $8 million. The total spent by the entire nontheatrical film field for the year was $389 million.[61]

The estimated number of nontheatrical motion pictures produced in 1960 dropped from the 1959 total of 9340 to 8900. The 16mm sound projector had its greatest sales in ten years—more than 50,000 machines were sold during the year. Taking into account the number of machines considered obsolete (15,000) and the number of second-hand projectors sold (13,500), the net gain for domestic use was estimated to be 43,500, not including 5500 exported. The total number of projectors in use as of January 1, 1961, was estimated at 727,000.[61]

The introduction of the Fairchild Cinephonic 8mm camera (Fig. 36) and sound projector (Fig. 37) and the Eastman Kodak Sound 8mm (Fig. 38) projectors marked the beginning of a new era in motion-picture projection. Credit for the first practical operating 8mm projector goes to the late Lloyd Thompson and Forrest O. Calvin back in 1952. With the exception of Tandberg's Elite 8mm sound projector (Fig. 39), the use of foreign imported 8mm sound projectors has not been significant to date.

Several laboratories in the country were able to produce 8mm sound prints by reduction from a 16mm internegative. Reductions from 35mm were made only on an experimental basis. High-quality contact prints were not feasible in 1960 on a quantity basis. SMPTE committees began working on standards for the placement of the magnetic track on the film, the distance from the picture to the soundhead, and other phases.

In nontheatrical motion-picture circles the subject of 8mm sound film and projectors has been the most discussed topic in many years. By the end of the year, numerous research projects and experimental uses involving 8 mm sound film were underway. A bibliography of 8mm papers and articles published in 1960 is given in the references.[62]

A recent development of Kalart Co. employs a new approach to sound slide-film (sound filmstrip) projection. The filmstrip operates on the principle of having every other frame contain the sound which is scanned simultaneously with the projection of an adjacent picture frame. The amount of sound per frame is limited to a maximum of 18 seconds.

An important factor in the significant gain of educational audio-visual purchases as well as of projector sales was the National Defense Education Act of 1958. This Act makes funds available on a matching basis for purchase of materials and equipment for science, mathematics and modern foreign languages. Even a more significant aspect of the NDEA is the Title VII support of new media research. Among research projects instituted during 1960 were these:

SMPTE-USOE: to evaluate the adequacy of audio-visual equipment for present and future educational needs and to point the way toward future improvements.

ASCD-USOE: (Association for Secondary Curriculum Development) to study the relationship of newer educational media to curriculum.

UFF-USOE: (University Film Foundation) to study the current status of university film production and its potential for advancing education.

Bibliographic Control Conference: to recommend ways of securing better cataloging and evaluation of the "newer educational media" materials (including films, filmstrips, kinescope, video recordings, etc.), and wider dissemination of information about them.

Sale of filmstrips and filmstrip projectors reached an all-time high in 1960. The filmstrip is well established as a basic teaching tool. Producers reported increases in the sale of filmstrips up to as much as 1000 more than the previous year.

An analysis of 591 new titles[63] indicates that business, organizational, and government sponsors made films in the following subject areas for classroom use:

	1960 Titles
Geography	149
Science	74
Sports	59
Social problems	57
Agriculture and Conservation	44
Home Economics	32
14 other subjects	176
Total	591

Of 4276 titles, motion pictures in science (656 titles) and geography (625 titles) lead as the most popular subjects for sponsorship. A complete course in high-school biology consisting of 120 films of 30-minute length, is a production of Calvin Productions in association with McGraw-Hill Publishing Co. Another contribution to science teaching was the series of ten films in the "Horizons of Science" series, produced by the Educational Testing Service in collaboration with the National Science Foundation.[64]

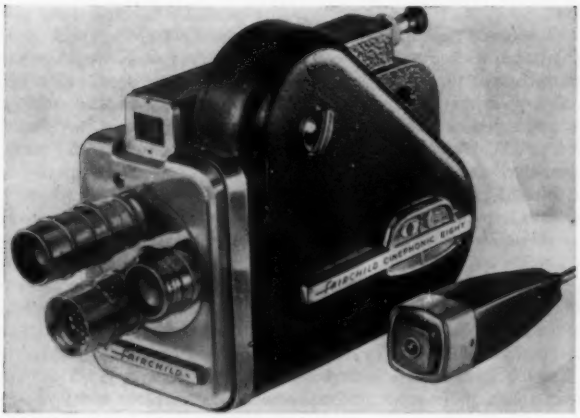

Fig. 36. Fairchild Cinephonic 8mm Camera.

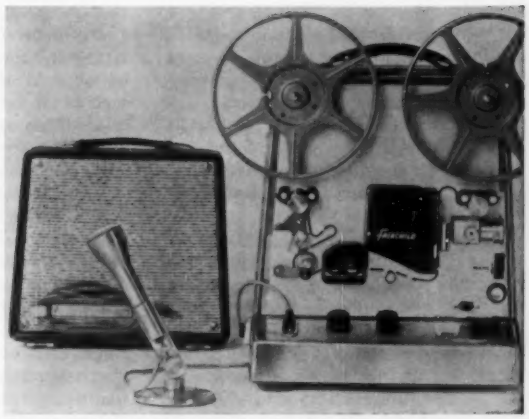

Fig. 37. Fairchild Cinephonic 8mm Sound Projector.

Production was expanded on programs of motion pictures for foreign language teaching by Encyclopaedia Britannica Films Inc. and the modern language department of Purdue University. Plans for an extensive program for the production of teaching materials on film, on video tape, and in other new media, were announced by the Learning Resources Institute, an organization sponsored by the American Association of Colleges and supported by the Ford Foundation.[64]

Filmstrip production on religious subjects climbed, while motion-picture production dropped off slightly, pulling down the total amount spent by churches and synagogues for audio-visual materials. Significant among film productions was a "Talk Back series" of 26 13-minute films by the Methodist Church for use on television and with nontheatrical audiences in conjunction with discussion panels. Foreign mission films continued to hold an important place. For example, a National Council of Churches production, *New Faces of Africa*, prophesied the trouble in the Belgium Congo.

An analysis of film libraries in the United States indicates that New York with 384 and California with 339 have the greatest number of film sources.[65]

A gradual trend in business motion pictures became apparent in 1960. Business films, more and more, are being integrated into planned units (sales programs, sales training courses, in-plant training courses, public relations and advertising programs). Possibly the most expensive nontheatrical film ever produced was Ford Motor Company's two-hour spectacular in color for use with the introduction of its 1961 line of cars. Industry-sponsored films took high honors during the year in both national and general audience award events. *Business Screen Magazine* noted eleven U.S. films that received top citations in two or more of the major competitions. *Universe*, produced by the National Film Board of Canada, received praise from many leaders as the unofficial "title winner" as one of the finest nontheatrical motion pictures of the year.

For the first time, high-speed color motion pictures were made inside of the living stomach, at Columbia-Presbyterian Medical Center. An 8mm motion-picture camera mounted on the eyepiece of a gastroscope was used. A bundle of light-transmitting glass fibers carried light to the stomach to furnish the necessary illumination.

High-Speed Photography

The growth of high-speed photography has been accelerating most rapidly during the past few years and has continued throughout 1960. New equipment and techniques have been developed as a corollary of an increasing need for high-speed photography in research, development and engineering activities in many separate areas of scientific endeavor and for the more stringent requirements in the area of precision measurement.

Papers* submitted for the 5th International Congress on High-Speed Pho-

* Much of the summary report here is based on the Program of the Fifth International Congress on High-Speed Photography. Many of these papers have appeared in the *Journal* beginning in October, 1960, and all will appear in the *Proceedings* of the Congress, to be published later this year by the SMPTE.

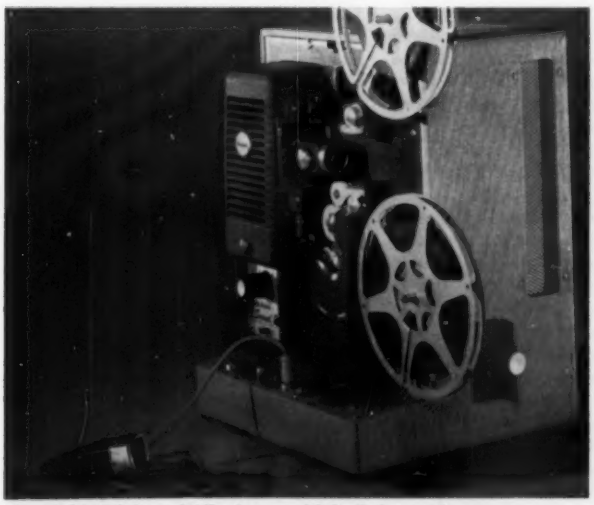

Fig. 38. Kodak Sound 8 Projector with built-in speaker.

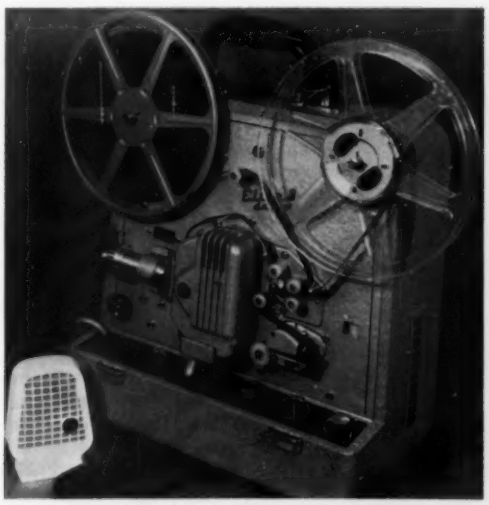

Fig. 39. Elite 8mm Sound Projector (Tandberg).

tography sponsored by SMPTE and held in Washington, D.C., October, 1960, probably reflect the most fertile areas of growth during the year. These papers, originating throughout the world, indicate that a preponderance of effort is being devoted in particular to faster and more intense short duration light sources, flash x-ray, and inertialess shutters. Of particular interest is the great variety of applications of high-speed photography reported by industry and universities.

Recent shifts in areas of interest are shown by a percentage breakdown on the affiliations of the authors of papers presented at the Congress; 40% were from research activities in the government; 20% from universities; and 40% in engineering and research from industry. Records of previous participation in the United States indicate a higher percentage from the government, and considerably less participation from U.S. universities. This, to a large extent, is the result of governmental contracts at these institutions, but also is due to more extensive usage for independent research.

Light sources of shorter than 10^{-8} second duration have been obtained by means of special techniques or control methods with good results at 10^{-9} second (also called 1 nanosecond or 1 millimicrosecond). This was exemplified by the work of Dr. E. J. G. Beeson of Leicester, England, who by using magnetic fields to break the lamp current, has obtained substantially square-wave pulses of light. Heinz Fischer is producing pulses of 10^{-9} second with intensities of 10^{7} candles/sq. cm. By improved technology, Dr. Fischer has further increased the output intensity, but has not reported the full benefits of his work during 1960. The Farrand Optical Co. has developed brightness up to 50 million candles/sq. cm. with light durations of 0.5 μsec. Harold Edgerton's work is continuing in this field with emphasis on repetitive flash with sharper cut-off and higher intensities. Russian scientists report pulsed light in the ultraviolet range at 10^{7} pulses/sec. A device under development which is of value to short duration lights is the optical maser. In this device light energy stored in a ruby crystal is rapidly released by the application of a triggering radio frequency voltage. This method suggests great promise for future development.

Efforts to obtain extremely short exposure times have been enhanced by further improvements in inertialess shutters. T. Mandell (Rochester University and the Imperial College of Science and Technology) is presently working on the development of image converter tubes with built-in amplification of the electron beam. The gain achieved in this manner permits switching by means of a 5-v pulse as compared with the more normal 8000 v pulse. Similar work in Russia indicates light amplifications of 100×. Although developments in this field show considerable progress, maximum resolution remains in the 15 to 20 lines/mm region. Kerr-cell improvement has been mostly in the area of superior control circuits such as the use of a three-polarizer Kerr cell with an optical transmission ratio of 10^{6}:1. The work of George Theophanis at Avco Research has developed the three-polarizer to eliminate "bleeding through" of light which occurs when two-polarizer cells are closed.

Work on flash x-ray seems to have increased in several independent geographical areas with consistently excellent results. The use of flash x-ray as a single exposure and repetitive flash for cinematography or framing cameras is increasing tremendously and is obviously becoming one of the most promising areas in high-speed photography. This important work was well represented at the 5th International Congress by papers from France, Germany, England and various organizations in the United States. A report on the work of W. P. Dyke at the Field Emission Corp. indicated excellent penetration and resolution with exposures as short as 50 mμsec. Work in stereographic x-ray is also reported by Dr. Dyke and the St. Louis Laboratories of France-Germany, which organization also reports some interesting work in x-ray cinematography of 60 frames at the rate of 12,000 frames/sec.

One of the most unusual developments in a new family of cameras of the million-plus frame/second class of rotating mirror cameras was introduced by Sigmund J. Jacobs of the Naval Ordnance Laboratory. The application of the focal plane shutter principle to smear camera techniques permits a very precise time definition in framing cameras. Other valuable and recent contributions to the high-speed field have been that of the Lawrence Radiation Laboratory's portable, rotating-mirror framing camera, weighing only 35 lbs, and capable of producing 12 frames at the rate of 1 million frames/sec. Advancements in rotating prism, as well as higher speed intermittent motion cameras, have resulted from the introduction of polyester base film with high tensile strength characteristics, which not only permit a thinner film base thus allowing a 25% increase of film length over standard spooling, but permit higher acceleration and more efficient usage because of the lowered mass. Of considerable importance to the field of rotating mirrors is the work of Willard Buck who uses extruded beryllium for a high strength-to-weight ratio and very low distortion characteristics in mirrors for framing and streak cameras.

An important indication of progress in the field in 1960 is the tremendous increase in commercial availability of the various high-speed cameras. Presently available are numerous precision cameras in the lower-frame-rate, high-speed rotating-prism, and ultra-high-speed classes. Also available commercially are cameras for streak, framing and cine records, whereas previously most special cameras were designed specifically for the research programs of each requesting organization. A wide scope of 16, 35 and 70mm cameras now covers frame rates from 24 frames/sec. up through several thousand frames per second, permitting careful selection for many research needs. Commercial production of numerous high-quality instruments still does not cover the entire field of high-speed photography, but we must remember that it was not very many years ago that such equipment was entirely unknown, and certainly not visualized as of potential commercial value.

Instrumentation

At the close of World War II, development work on all types of optical instrumentation was severely curtailed by the discovery and development of electronic measuring devices (radar). From that time to the beginning of the Space Age, comparatively little fundamental work has been accomplished in the optical instrumentation field. As a matter of fact, in the past many workers in this field felt that electronic measuring and instrumentation systems would completely replace optical instrumentation methods and techniques. The advent of the Space Age has again created great interest in the development and refinement of existing optical system and the expansion of fundamental concepts into new sophisticated designs and systems.

One of the greatest factors causing error and degradation of data, with respect to optical systems, is the Earth's atmosphere. Optical systems of all types are, in varying degrees, affected adversely by it. The placing of optical systems outside the Earth's atmosphere obviously greatly increases the system capability. The resolution is limited now by diffraction only and is a function of the system aperture. This aperture will become increasingly large for airborne optics as the state of the art advances.

Camera stabilizing platforms are currently being built to hold accurately long-focal-length lenses on a target for extended periods of time. On one project, the field-of-view of the telescope-camera combination is televised to the astronomer on Earth to enable him to shift the entire platform, as required, for accurate boresighting. These sighting telemetry systems will utilize some type of coding for TV transmission, thus limiting the bandwidth and, consequently, conserving power. Furthermore, systems are now being manufactured that will not only televise information back to earth, but will also simultaneously record on film various required data. This film, in turn, will be processed aboard the satellite and may be recovered intact at a later

date. The information obtained on one small roll of film would require hours of telemetry transmission. It is hoped that final system resolution will yield as high as 6 million "bits" of information per square inch of film.

The far ultraviolet and the infrared portions of the spectrum are being investigated for sky-mapping purposes and for object identification. Great interest is being expressed in this area by the meteorologists. The satellite Tiros is the result of work in this field.

High-altitude work involving optics used with TV systems generally require that the diameter of the main objective be nearly equal to the focal length of the system. Since long lenses are required, the physical size of the main objective becomes very large. However, with the use of film as a recording medium, a smaller aperture is acceptable, thus decreasing the problems involved in packaging optical equipment in the satellite. The expanding use of aspherical lens surfaces has also aided the designer in obtaining higher performance optical systems of smaller physical size and higher speed.

Optical tracking has developed into a very accurate method for determining satellite orbits. The Naval Ordnance Test Station at Inyokern has modified Askania Cinetheodolites for this specific purpose. Many other types of cameras are also utilized for this purpose. One outstanding example is the Baker-Nunn camera. The Perkin-Elmer Mark I Roti (Recording Optical Tracking Instrument) can gather accurate information up to several hundred miles. These types of precision instruments are being located throughout the world to gather more accurate information on the satellites now in orbit.

There is a great deal of fundamental work to be done in this field as well as in the general field of optical tracking. One company has proposed and is developing a fully automatic complex. With this system, the tracking camera operator is eliminated as this function is accomplished automatically. The XY coordinates from the tracker, corrected for tracking error, are sent into a master computer and the information can either be punched out on cards or can be recorded on magnetic tape for future study. Digital real time information is incorporated in this system. According to early review of the prototype system, greater accuracy can be expected than that obtained by human operators, at a much more rapid rate.

During 1960, many new processes and techniques were developed in the various fields of photographic instrumentation and the number of manufacturers, as well as users, continued to increase. Conservative estimates for 1961 indicate that the military will use in excess of $200 million for instrumentation lenses and projectors alone. Fiber optics are being perfected and many new uses are being found for them in all scientific fields. The cost is continually dropping as production increases.

Many new types of systems have been devised for obtaining data from film. The Track Instrumentation Branch of the Naval Ordnance Test Station at China Lake, Calif., has developed a new method for obtaining data from war-head impact tests. Variables to be measured included impact velocity, deceleration rate, time of target contact, time of five electrical functions within the war-head itself, and the time of detonation of the war-head. All of these data are recorded on three feet of 35mm color film.

In line with the recent trend toward solid state control devices, North American Aviation Co. is now using a newly developed transistor with a high current rating and surge capacity. These transistors control high-speed cameras aboard rocket sled vehicles. Excellent reliability is expected with this new switching system. Lockheed Aircraft Corp. has utilized optical instrumentation very extensively in both the development and production of Polaris for the Navy and for the Agena series of vehicles for the Air Force. "On board" photographic instrumentation equipment, as well as ground-based camera complexes, are used on both projects.

The Wollensak Optical Co. has developed a new combination 40 to 80-in. Versatel catadioptric lens system, designed and built to help solve one of RCA's difficult radar boresighting problems. Other new products are in the design stage and will be available in the near future. Among these is a new pushbutton-controlled Fastax camera with many new features. The Naval Ordnance Laboratory in Maryland has developed a unique system for the simultaneous recording of data from 24 points on a model located in a shock-tube wind-tunnel. The camera records temperature and pressure information with microsecond time resolution.

Eastman Kodak Co. has introduced a new ultra-high-speed color film, Kodak Ektachrome ER Film, which is being used extensively in instrumentation work for available light studies. They have also reported a system for evaluating the performance of high-speed cameras with respect to image steadiness.

During 1960 many advances were made in the art of rapid film processing. Most of this work is the result of military requirements, but, as usual, these developments have many commercial applications. Film can now be exposed, processed and projected in a few seconds, with surprisingly good quality. There are many different types of systems now in use. One system known as the Rapromatic Process employs a saturated paper web called Raproroll. This material is wound between the layers of the film on the take-up reel of a camera as the film is being exposed. Due to the action of the paper web, the fully developed film can be projected a few minutes after exposure.

A remarkable method for recording information on film has been developed by General Electric physicists.[100,101] Electromagnetic signals are placed on the film and frozen by r-f heating techniques. The information can then be played back in a manner similar to that employed for magnetic tape. The original information can easily be erased and the film reused as desired. This thermoplastic method of recording is not yet ready for commercial use.

Flutterless stop-motion projectors for data analysis work have recently been perfected. No flicker is perceptible regardless of the slowness of the projection frame rate. These machines are invaluable when hundreds of feet of film from every single test must be studied. The Weinberg-Watson projector and the L & W Photo Products projector are of this type.

Armed Services

A new wing-pod motion-picture camera housing has been designed by the 1352nd Photographic Squadron of Lookout Mountain Air Force Station. The unit can be attached to the wing of any aircraft equipped with external bomb racks. The mount has been used successfully on many types of jet aircraft subjected to a wide range of positive and negative forces and at supersonic speeds and high altitudes. The housing was designed to utilize a Bell & Howell Type A-7 Camera, equipped with a 24-v motor, and to permit use of lenses up to 6-in. focal length. A 400-ft magazine is mounted at the rear of the camera and a mechanism is provided to transport the film from the magazine to the camera and return. The camera is operated from a switch in the cockpit. A Huber mount installed in the cockpit with a 35mm Mitchell viewfinder completes the installation.

A radio-controlled camera system, designed by the U.S. Army Signal Missile Support Agency at White Sands Missile Range, New Mexico, has been described.[66] This system provides a means for documentary coverage of guided missile, rocketry and other hazardous tests in which camera operator safety and economic utilization of personnel present a problem. The Radio Controlled Camera System (RACCAS) is a highly mobile and modified M-220 van, designed to house and transport all equipment and personnel necessary to photograph historical events at any site on the test range. The system eliminates the necessity of laying hard line for each mission and avoids the hazard of destruction of such lines from burning debris, rodents, etc. A tonal-controlled radio

Fig. 40. Camera equipment and radio receiver at simulated missile firing, U.S. Army Signal Corps.

signal controls the ON and OFF functions of up to 28 cameras up to a maximum line-of-sight distance of 15 miles (Fig. 40). The transmitter, located in the van (Fig. 41) operating in conjunction with a quick-call unit and a programmer system, has the ability to control the remote camera receivers in several ways: (1) through the quick-call unit all receivers can be activated at the same time by one signal; (2) through the quick-call unit, individual receivers can be activated by individual signals if the delay between required signals is greater than five seconds; or (3) through the programmer system, individual receivers can be activated in a predetermined program with minimum delays between signals of two seconds. The programmer system is capable of controlling up to seven remote camera receivers and each remote camera receiver has the ability to control up to four camera systems.

Fig. 41. Remote control equipment, U.S. Army Signal Corps.

The U.S. Naval Photographic Center has completed the installation of a closed-circuit TV kinescope film production facility, planned to provide an additional service in the production of certain types of black-and-white motion pictures, where particular emphasis is placed on speed and economy of production. The equipment includes three TV cameras operating from the Center's motion-picture soundstage and a TV film camera chain equipped to insert 16mm motion-picture stock footage and 35mm still slides into the film as required. In the first two months of use a total of 78 reels of motion-picture film was completed.

Early in 1960 the U.S. Army established a closed-circuit system at WFL-TV, Fort Lee, Va., with the primary mission of supporting the Quartermaster School of the Quartermaster Training Command. The initial installation consisted of a 30 by 50-ft studio, two vidicon camera chains, a mobile remote van, some four miles of distribution cable, and a microwave system including a 78-ft tower assembly at the studio site. The distribution system provides 491 outlets in 67 buildings throughout the post with the majority of outlets located in classrooms. Provisions have also been made for making the television signal available to troop companies in company day rooms and battalion classrooms.

The initial goal of training a large group of TV instructors has been realized during 1960 and the facilities can now be used for presentation of courses requiring extreme close-ups and other areas involving visual material. Additional equipment has recently been added and a second studio will be ready for use shortly, thus enabling the activity to be expanded. This should permit the handling of a larger work load for the Quartermaster School and provide for a broader troop informational program for the entire post.

Space Technology

The outstanding event in space technology for 1960 was undoubtedly the launching, on April 1, of Tiros I,[67] the first successful weather-study satellite, built by RCA under the sponsorship of the National Aeronautics and Space Administration and the technical direction of the U.S. Army Signal Corps. (Fig. 42). Equipped with two television cameras which sensed cloud-cover formations around the earth, Tiros demonstrated the utility of satellites for the survey of global weather conditions and the study of other surface conditions from space. This satellite transmitted a total of nearly 23,000 cloud-cover pictures, more than 60% of which were good-quality photographs useful to meteorological research.

One of the cameras had a wide-angle $f/1.5$ lens, and the other had a narrow-angle $f/1.8$ lens. Both cameras scanned at 500 lines/frame and had a video bandwidth of 62.5 kc. The Tiros instrumentation also included a magnetic-tape video recorder for each camera, two timer systems for programming progressive camera operations, and sensing devices for measuring vehicle attitude and attitude and equipment operation. Ground stations at Fort Monmouth, N. J., and Kaena Point, Hawaii, commanded the satellite to perform certain functions and received the satellite-transmitted pictures. Tiros II was launched on November 23. In addition to television cameras, this version carried infrared equipment to measure the heat balance of the earth and the radiation distribution in specific spectral regions.

Among other outstanding accomplishments of satellites used for peaceful purposes was the impressive record of findings obtained by Pioneer V, launched March 11, 1960. In addition to transmitting information successfully over a distance of 22.5 million miles, observations were made of cosmic rays, radiation associated with solar flares, and the magnetic field in interplanetary space.

A big step on the road toward the transmission of simultaneous TV signals, was the successful experience with Project Echo. The world's first passive communications satellite, 100 ft in diameter and weighing 166 lb, was an inflatable package made of aluminum-coated Mylar polyester film (Fig. 43). This space balloon carried two 11-oz radio beacons for locating and tracking.

The first successful two-way voice communication was successfully bounced off ECHO I on August 13, and the first reported picture transmission took place

on August 19. Voice transmission has been made successfully between the Bell Telephone Laboratories at Holmdel, N. J., and the Jodrell Band antenna in Manchester, England. The importance of these successful experiments in the future development of TV communication can scarcely be exaggerated. These experiments also demonstrated the feasibility of using passive satellites for point-to-point communications throughout the world.

Bell Laboratories, in cooperation with Hughes Research Laboratories, are at work on an optical maser, using ruby rods about 2.25 in. in diameter. The maser emits coherent light in short bursts, rather than as a smooth pulse. As a communication experiment, a ruby optical maser was set up at Holmdel, N. J., and aimed at the Murray Hill Laboratories 25 miles away. Red flashes, clearly visible to the naked eye, registered on photomultiplier tubes. It is believed that, with further development, it may be possible to modulate the maser output, thereby permitting the simultaneous transmission of many television signals or telephone conversations. It is expected that masers will be an important component of space communication systems.

Considerable progress has been made in planning new and long-range space systems. Part of the instrumentation for NIMBUS, NASA's advanced meteorological satellite, is an electrostatic tape camera, now in an advanced state of development at the Astro-Electronics Division of RCA. This camera provides an image-recording technique which combines many of the advantages of magnetic tape and photographic film, without certain of their disadvantages for space applications. The plastic film used in this new camera has a considerably greater information storage capacity than has magnetic tape; in addition, it makes the requirement for a separate TV camera unnecessary by combining the imagery and recording on the same medium. The image can be stored for extended periods, yet can be instantly erased if desired and the film reused. The halftone rendition of the camera is reported to be equal to that obtainable from conventional TV vidicon cameras. A version of the camera suitable for satellite use is expected to be made ready by the summer of 1962.

A new generation of spacecraft is currently under development. Three new scientific satellites, designated as observatories, are included on the advanced program and have been named the Orbiting Solar Observatory, Orbiting Geophysical Observatory, and Orbiting Astronomical Observatory. Several spacecraft for lunar and interplanetary exploration are in the early design stages. These have been listed as the Ranger type for lunar and early interplanetary flight, followed by the Mariner for later planetary studies. Close studies of the moon will be made by a lunar soft-landing spacecraft, called Surveyor, equipped with TV cameras, followed by a heavier mobile spacecraft, named Prospector, for lunar surface exploration.

A significant advance in manned space flight to follow Project Mercury is the plan for a dual-purpose spacecraft that can be used as an earth-orbiting laboratory or to circumnavigate the moon. This project, Apollo, will serve as an intermediate step toward the future goal of landing men on the moon and nearby planets.

In the area of military missions, satellites are expected to play a very significant role in the not too distant future. On November 12, 1960, the Air Force put into a polar orbit Discoverer XVII, the first of a series of new military vehicles capable of changing course in flight. The instrumented capsule of this vehicle was recovered two days later after its thirty-first pass. Valuable information on the Aurora Borealis was gathered and is to be analyzed.

According to reports carried in the New York Times, November 20, 1960, satellites are also being designed to test intelligence gear for future launchings in the Samos and Midas series. Samos satellites will carry cameras and television equipment capable of photographing potential military targets. (The Samos capsules are designed to carry back to Earth photographic films and other data.) Midas satellites will carry infrared devices to give instant warning of the launching of missiles anywhere in the world.

Fig. 42. TIROS during pre-flight tests. Note lens of wide-angle TV camera and four rod-like transmitting antennas. Solar cell array covers sides and top.

Progress during the past year has indeed been rapid, but one can readily expect an accelerated effort as more and more flight missions are formulated and the formidable problems they entail have to be faced.

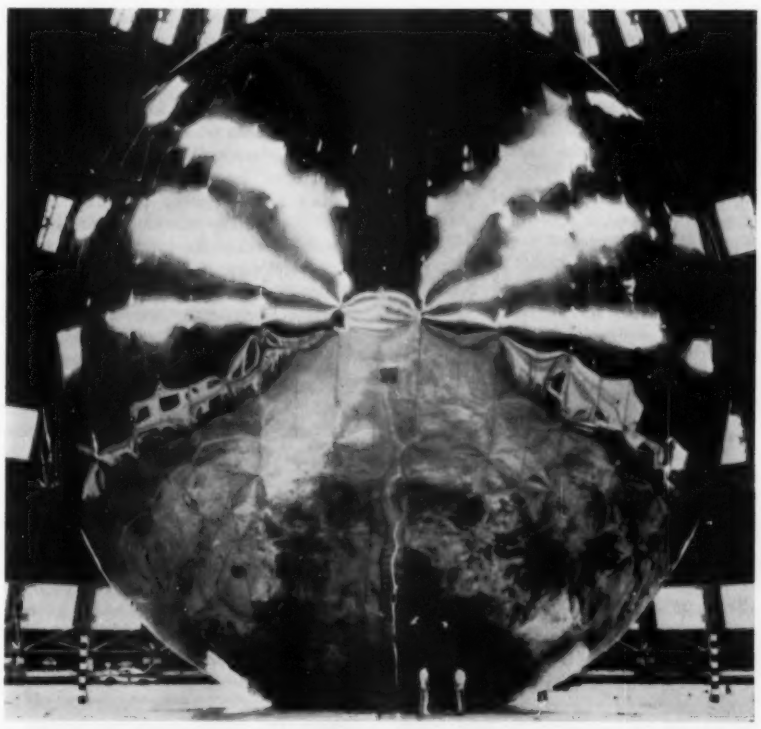

Fig. 43. Echo satellite during ground inflation tests.

Ten papers on Space Technology and Image Sensing appeared in the January 1960, issue of the *Journal*.[68]

Television Recording

During 1960 the number of video-tape recorders showed a significant increase over a comparable figure for 1959. A number of significant technical refinements were introduced, including the development of a new single-head recorder. Steady progress in the adoption of industry standards was related to the increasing scope of uses of video tape. Tape editing tools were developed while the use of television film recording increased and thermoplastic recording made news.

Expansion of Video-Tape Recording

By the end of 1960, 951 Ampex and RCA video-tape recorders were in use throughout the world. The additional 357 units (399 were added in 1959) indicated a continuation in the rapid growth in video-tape recording.

Of particular interest is the 130% increase in the number of machines installed in mobile units, reflecting the increasing emphasis given to on-location uses for video tape. The number of organizations engaging in mobile uses of tape increased 157%!

The number of machines in use by the educational broadcast stations and centers increased more than 100%. The number of machines installed in locations outside of the United States increased 75% whereas the total number installed within the United States increased about 55%.

The number of machines in use at the end of 1960 compares with the number at the end of 1959, as follows:

	1959	1960
In 218 U. S. Commercial Broadcasting Stations	221	346
In 3 U. S. Commercial Broadcasting Networks	76	101
In 21 U. S. Commercial Independent Producing or Recording Companies	35	52
In 53 U. S. Educational Broadcasting Stations or Program Centers	31	63
In U. S. Government or Industrial Groups	72	111
U.S. Total	435	673
In 136 stations or other Organizations outside U.S.A.	159	278
Total	594	951

Included in the total are 71 machines used in 60 mobile units by 54 organizations and 79 machines equipped for color recording and playback.

Technical Advances in Video-Tape Recording

A significant development leading to the improvement of technical quality was the automatic, line-by-line, time-delay compensator developed by CBS-Chicago, which was further refined by Ampex during 1960.[69] This device essentially eliminates the unevenness in vertical lines which sometimes results from incorrect adjustment of head parameters. This unit, in conjunction with high-precision head-servo systems, such as the Ampex Intersync,[70] is expected to enable the complete lock-in of video-tape recorders to other station equipment permitting full use of video effects for integration of tape, film and live program segments. Use has been made of Intersync alone, as a start in this direction, 130 of the Ampex recorders having been equipped with Intersync by the end of 1960. A first step in this direction is available for RCA machines in the form of a vertical-rate lock-in system called Switch-Lock, introduced during 1960.

More widespread use of improved high-frequency modulation systems with accompanying greater high-frequency preemphasis provides an advance in effective signal-to-noise ratio and picture sharpness. The increasing use of tape rerecordings of second and higher generations makes improvements in this direction extremely important. Both the RCA machines and the latest model Ampex machines[71] incorporate this feature and Ampex makes available a modification kit for updating earlier model equipments. Improved color electronic circuits were made available by RCA.

Recognizing the importance of improving the entire video channel to achieve the best possible picture quality, certain stations, independent producers and network groups successfully initiated the use of new 4½-in. image-orthicon-type television studio cameras for original recording pickup.

By the end of 1960, action was well along toward the tightening of test tolerances on new and rebuilt video heads, an area which has become critical with the advent of large-scale interchange of tapes among different machines and different organizations.[72,73] One promising development in the improvement of the rotating head mechanism is the use of air bearings introduced in late 1960 by RCA for incorporation in the RCA recorder tape transport system.[74]

A step in the direction of improved portability was taken by Ampex in the VR1001 series "compact" machine introduced in April, 1960. By the end of the year, 51 of these units were in service in both mobile and fixed installations. This unit utilized the same chassis and components as the standard Ampex machine, repackaged in a more compact housing. A fully transistorized processing amplifier introduced in April, 1960, by RCA gave further promise of a trend toward reduction in size and weight of video-tape equipment. Perhaps the specialized, transistorized military recorders shown by both Ampex[75] and RCA[76] indicate the longer term possibilities in this direction.

One major new approach to video-tape recording was disclosed by the Japanese Company, Toshiba (Tokyo Shibaura Electric Co. Ltd.).[77] In this system, a single recording head, rather than four heads, is rotated against the moving, 2-in.-wide tape. The tape, traveling at 15 in./sec makes one helical wrap around a rotating drum, on which the single head is mounted. A diagonal track, 26½ in. long, containing one television field is laid down on each successive rotation. The use of a single head is intended to alleviate some of the day-to-day problems involved in achieving matched outputs from the four heads of the present equipment. Also, because each rotation of the head corresponds to one complete picture field, still-frame images can be obtained, within limits, with the tape stopped — a possible boon to tape editing. The single head approach, however, is not without its own problems in the area of splicing and in the maintenance of precise speed relations between the head and the tape. As of the end of 1960, one unit had been delivered to NHK for evaluation and test. It was anticipated that units would be commercially available by April, 1961. An adaptation of this scheme to color recording was announced by the Victor Company of Japan, Ltd.[78]

Technical Standards and Practices for Video-Tape Recording

Steady progress in the formulation and publication of industry technical standards continued under SMPTE auspices.[79] During 1960 the following four proposed American Standards were approved by the SMPTE Video-Tape Recording and Standards Committees and published in the *Journal*.[80,81]

PH 22.123, Dimensions for 2-Inch Video Magnetic Tape
PH 22.121, Characteristics of the Audio Records for 2-Inch Video Magnetic Tape
PH 22.120, Dimension for Video, Audio and Control Records on 2-Inch Video Magnetic Tape
PH 22.122, Speed for 2-Inch Video Magnetic Tape

In addition two SMPTE Recommended Practices were accepted and published:

RP-5, Patch Splices in 2-Inch Video Magnetic Tape[80]
RP-6, Modulation Levels for Monochrome 2-Inch Video Magnetic Tape Recording[81,82]

Currently, four additional proposals have received approval of the Video-Tape Recording Committee and are before the Standards Committee:

VTR 16.1, Dimensions for 2-Inch Video Magnetic Tape Reels
VTR 16.3, Specifications for Monochrome Video Magnetic Tape Leader
VTR 16.10, Control Track Record for 2-Inch Video Magnetic Tape Recordings

VTR 16.11, Signal Specifications for Monochrome Alignment Tape for 2-Inch Video Magnetic Tape Recording

Finally, there is one Proposed Standard (Tape Vacuum Guide Radius and Position for Recording Standard Video Records) and one Recommended Practice (Pre- and Post-Emphasis) in the process of being completed by the Video-Tape Recording Committee.

A guide to video-tape signal characteristics intended to help establish more uniform understanding of problems encountered in the network transmission of video-tape progress was published under the auspices of the Video Transmission Engineering Advisory Committee.[83]

Progress was made on preparation of Standards and Recommended Practices on video-tape operations by the Broadcasters Television Advisers Committee on Video-Tape Usage of the National Association of Broadcasters.

Video Recording Tape

The principal manufacturer of recording tape continued to be Minnesota Mining & Manufacturing Co., which reported an increase of about 25% in the quantity of video tape delivered during 1960 as compared to the quantity delivered during 1959. Electro-Musical Industries, however, supplied limited samples to the U.S. and supplied a portion of the British and European requirement during 1960. In the United States, Reeves Soundcraft supplied samples, but was not in commercial production as of the end of 1960. Improvements in the techniques of utilizing magnetic tape were noted.[84]

Editing of Video-Tape Recordings

Demonstration of devices intended to ease the problem of locating the cutting point and thus to simplify video-tape editing were made during 1960. The TVola developed by station KTLA, which provides a succession of still-frames by means of electronic storage tubes, was demonstrated to the industry and was used in production of the taped Western, *The Wrangler*, shown on NBC.[85] A similar principle was demonstrated by Conrac. Improved splicing and edit-pulse localizing devices were also announced.[86] Several organizations demonstrated and began using synchronized sprocket, or nonsprocket, multitrack audio tape to facilitate the editing of video tape on a double-system basis.[87]

At NBC-Burbank an editing system employing television film recordings as work prints for editing and then as masters for final tape cutting continued to be used successfully on a number of shows.[88]

Electronic editing was practiced in a few cases, being limited during 1960, however, by the late availability of full sync-lock-in capability for video-tape machines together with the quality losses incurred in re-recording.

By and large, the facilities and techniques for the editing of video tape as of 1960 gave the impression of being experimental and somewhat crude in comparison with those employed routinely in the motion-picture industry for 35mm film.

Uses of Video-Tape Recording

It is becoming difficult to name a type of television program material that has not been recorded on video tape. During 1960 news was made in the program area with shows ranging from high-budget color "specials" through a wide variety of major news events, to an outdoor Western series.[89,90] Tape-recorded commercials became commonplace both on the network and local market levels. National spot commercials, some utilizing television film-recorded dubs from video-tape originals, increased in use. In the United States an increasing number of serial programs (including *The Wrangler*), several mystery drama series, the critically acclaimed NTA Play of the Week series, other dramatic series, several soap operas, most of the variety and musical shows and many of the panel shows were handled regularly via tape. The use of video tape for "specials" became almost standard practice. However, it should be noted that tape usage for network shows was principally for those programs which would otherwise have been done "live," with very little net effect on filmed-series shows to date. Use of video tape in local stations for prerecording of local programs and of local and regional advertising continued to be more widely practiced in an increasing number of stations. Syndication of programs or commercials by physical distribution of tape duplicates, however, continued to be a relatively small scale effort.

In the special events field, 1960 was a frenetically busy year for video tape with lavish network and independent coverage of the U.S. political conventions and election, of history-making United Nations proceedings, of international visits by heads of state, and of the attempted Paris Summit Conference. Coverage of events in countries having television standards other than those for which the tape rebroadcast was intended became routine as exemplified by the CBS coverage of the summer Olympics in Rome, Italy. In this operation, a Fernseh (West German) standards converter located in Rome with associated Ampex Videotape Recorders produced tapes on United States standards from the RAI broadcast which were edited, jet-flown to New York, and used in daily shows on the CBS Network throughout the Olympics. This standards converter was subsequently moved to CBS-New York, where, as the only such unit in the Western Hemisphere, it was being used extensively in international interchange in both directions by the end of 1960.

In addition to widely increasing uses for program pre-recording, the well-established use of video tape by networks in the United States and by the Canadian Broadcasting Corp. to delay programs to accommodate the various North American time zones continued to represent a significant portion of the usage of video tape.

However, the prize for "far-out" use of magnetic tape for picture recording must go to one of several nonbroadcast applications—the recording of cloud-coverage from Tiros in its orbit.[91,92]

Other Television Recording Media

Far from wiping out television film recording, video-tape recording has brought about an *increase* in the negative footage of film exposed as compared to the situation prior to tape. As one example, the weekly program hours recorded on film by CBS-New York during the spring of 1960 ran 40% above the peak load of the pre-video-tape era. The need for film prints to service syndication markets (somewhat less than half of the U.S. commercial stations are equipped with video-tape equipment), the advent of considerable nonbroadcast recording, sometimes in direct competition with the industrial film industry, and the need for film dubs of taped commercials for convenience in agency use, helped bring this about. In response to this pressure, efforts were made by several broadcasters, independent producers, and manufacturers toward improvement of film recording quality.[93–95] By the end of 1960, it appeared that film recordings competitive in quality with present-day tape or with direct film were feasible.

A slow-motion television film recorder was announced by the Japan Broadcasting Corp. in which a 2.5 to 1 reduction in motion speed was achieved.[96] Several film recording system developments in the U.S.S.R. were reported.[97–99]

The possibilities of thermoplastic recording developed by General Electric Co. were widely shown during 1960.[100,101] Progress during 1960 toward perfection and adaptation to broadcasting of this potentially very important medium was not specifically reported.

Television Relay Systems

Television network service was available to 488 television broadcasting stations in 318 cities in the United States at the end of 1960, compared with 476 stations in 311 cities at the end of the previous year (Fig. 44). These do not include repeaters and translators which pick up and rebroadcast programs from interconnected stations.

Closed-circuit television facilities were supplied on 54 occasions during 1960. A total of 14 employed color television.

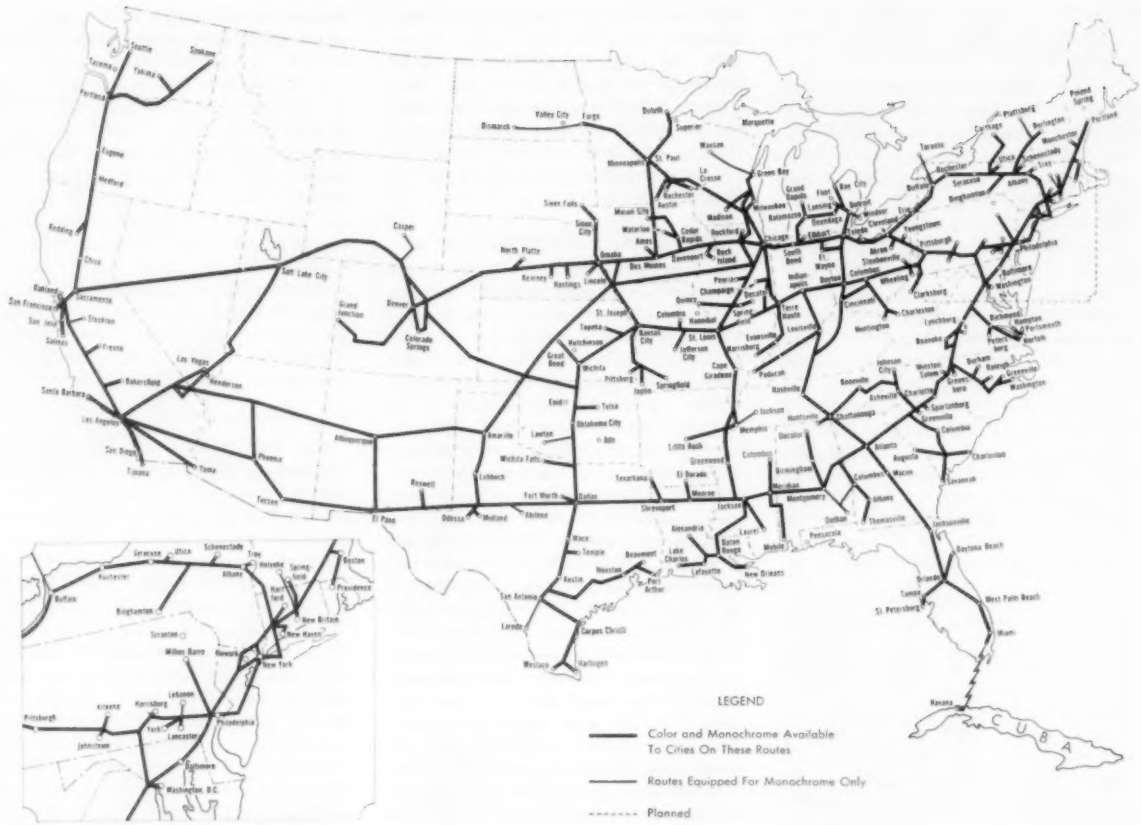

Fig. 44. Bell System TV network routes.

Service ranged from transmissions between two points to a championship boxing match transmitted to 170 locations in 129 cities. The most complex closed-circuit service during 1960 was for a fund-raising dinner and it involved transmissions from 8 cities to receiving locations in 64 cities. A total of 16 closed-circuit broadcasts included coast-to-coast hookups. Closed-circuit facilities were used for a number of events, including stockholders meetings, sales meetings regarding new products, fund raising campaigns, automobile shows, medical meetings, an art auction, boxing matches, hockey and football games.

Educational programs in Hagerstown, Md., are seen on more than 650 television receivers in 38 public schools. Present plans call for providing similar services in Cortland, N.Y.; in Anaheim, Calif.; and in South Carolina on a statewide basis. Educational television service is being furnished to the military forces in Huntsville, Ala., to assist in training personnel in missile operations.

Transmissions of slowed-down motion pictures by transatlantic cable between London and New York were inaugurated during 1960. This arrangement permits transmission across the Atlantic Ocean of successive frames of motion-picture material covering noteworthy news events for broadcast on regular television networks. The service began in time to permit viewers in Europe to see portions of the United Nations General Assembly meetings in New York, which were attended by Premier Khrushchev of the U.S.S.R. The transmissions are made over radio broadcast facilities in the transatlantic cable. Transmission requires one-hundred times the time required for normal viewing.

Color Television

During 1960, color television network program time increased from the 1959 estimated total of 20 hours per week[102] to 30 hours per week. During the past year increased emphasis has been placed on pickup of color TV programs under studio lighting levels only slightly in excess of those used for monochrome TV. Such programs as: *Meet the Press* and *Jack Paar Show* now use light levels of approximately 200-ft-c, incident, with image-orthicon tubes in the color camera having twice the sensitivity previously used.[103]

Pickup of outdoor sports events such as baseball, football, tennis and parade spectacles has increased significantly and color fidelity has improved under a wider range of illumination. Color TV mobile units were placed in operation by S & L Research Labs. (Red Skelton) and Glenn-Armistead, Inc. These organizations produce complete color-videotape recordings on location using NTSC standard color camera systems.[104]

Developments based on monochrome image-orthicon camera stabilization have been extended to color image-orthicon live camera chains and to 3-vidicon color film reproduction cameras. By the use of precision-super-regulated voltage and current sources it is possible to re-cycle the operation of such cameras from a cold start to peak performance in fifteen minutes without any circuit readjustments, and to maintain this peak performance for long periods of time. This procedure eliminates any need for long warm-up time and readjustments during operation. In September, NBC Studios in Brooklyn modified four-color image-orthicon camera chains to operate with super-stabilization. The performance improvements, especially for long color taping sessions, are of great significance.

The obvious convenience to artists has influenced the increased color taping of network color programs. Particularly gratifying results have been obtained in producing technical quality and color fidelity improvements to support this procedure. Demonstrations by Professor W.

L. Hughes of Iowa State University for broadcasters show possible concepts for the production of simplified color cameras of reduced cost.[105]

Activity in color TV programs by regional stations in live and film originations has increased markedly.

Pay Television

The year 1960 saw a great acceleration of activity in the pay-television field. On February 26, the Telemeter system of closed-circuit pay-television went into operation in Toronto, Canada. An area enclosing approximately 14,000 homes was wired with coaxial cable and during the Spring and early Summer 6,000 Telemeter units were installed in homes served by the cable. The system furnishes three channels of pay-television to its subscribers in addition to a program information channel, all being carried at frequencies below Channel 2. A train of pulses is associated with each of the program channels and serves to actuate a coin demand mechanism (Fig. 45) contained in an attachment to the subscriber's receiver. Upon payment of the required coin the subscriber's attachment functions to convert the low frequencies on which the programs are transmitted up to Channel 5. The Telemeter attachment delivers its signals to the customer's receiver at Channel 5 after payment. The Telemeter device contains a credit storage feature so that if the customer overpays, he is able to use the credit stored to pay for a future program.

The system has been in successful operation throughout 1960 and further expansion is planned in 1961. Programs included current motion pictures, sports and entertainment specially produced for the pay-television system.

During 1960 International Telemeter Co. applied to the Federal Communications Commission for an experimental broadcast authorization in order to conduct experimental transmissions of its broadcast pay-television system. A construction permit was granted in December, 1960, and transmissions were scheduled to begin in Los Angeles, in January, 1961. In the broadcast system picture and sound are sent in a nonstandard form and attachments at the subscribers' receivers convert them into a form usable by the normal television set at its antenna terminals.

The Telemeter broadcast unit is placed between the subscriber's antenna and the antenna terminals of his television receiver. It contains a 12-channel tuner so that any channel may be used for pay-TV programming. Like the Telemeter closed-circuit unit it is a coin-operated device and receives as part of the Telemeter transmission a program of pulses which control the coinage demanded by the unit. In addition, as in the closed-circuit unit, there is a magnetic tape which records the identity of all programs purchased. The broadcast unit has the same credit storage features as the cable unit.

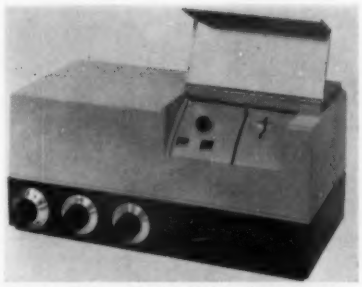

Fig. 45. Telemeter broadcast home attachment.

Fig. 46. Decoder for Phonevision system, of subscription TV (Zenith Radio Corp.)

During the past year Zenith's technical activities in the subscription television field were directed primarily to perfecting its broadcast subscription television system. Compared with earlier systems, Zenith succeeded in simplifying the equipment considerably, not only from the viewpoint of subscriber operation of the decoder unit (Fig. 46), but also in respect to adapting the unit to a television receiver.

The operation of the decoder is now controlled by one single dial to be set for each individual program, while the system permits either periodic billing or cash payment by coins or tokens. A high degree of technical sophistication has been incorporated in the subscriber decoder. The instrument prints the bill itself, releasing it to the subscriber for payment after the latter, upon instructions from the operating company, has dialed a special number of the decoder. In addition, an electronic tape, inaccessible to the subscriber, maintains a complete auditing record of all subscriptions made. A correlator circuit prevents the recording of subscriptions on the bill and the electronic tape (or in the case of a coinbox decoder, the insertion of tokens or coins) until it is found that the correct program number has been dialed and that the subscriber decoder and television receiver are in satisfactory operating condition.

Zenith also reports the development of a closed-circuit subscription television system, which as far as subscriber operation is concerned, appears to be identical with Zenith's broadcast system.

Skiatron Electronics & Television Corp. during the past year continued the development of the new Skiatron Central Billing System (Fig. 47) which for wired subscription television makes possible an economical, foolproof and simple

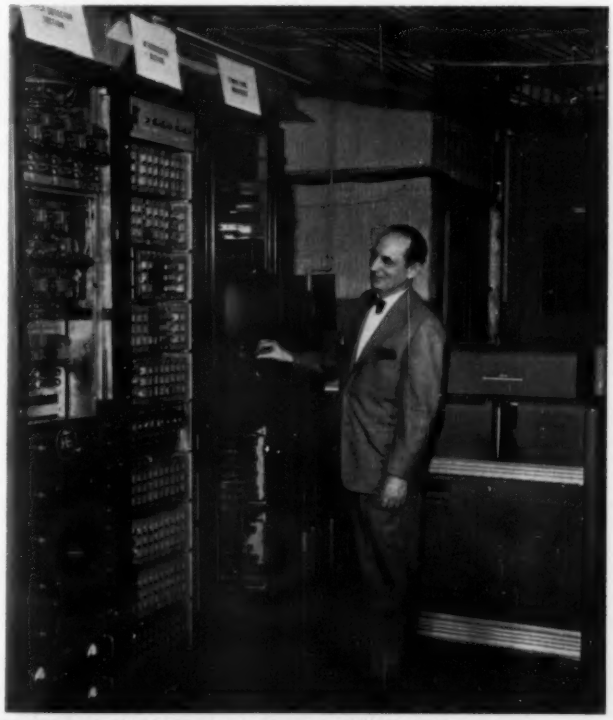

Fig. 47. Major units of Skiatron-Vision Central Billing System.

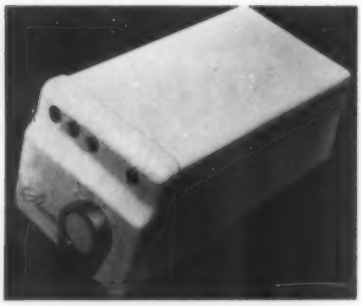

Fig. 48. Transponder for Subscriber-Vision central billing system (closed wire method). Device connects with receiving set and one of three programs may be selected by turning the dial (Skiatron).

Fig. 49. Control box for Key TV system (TelePrompTer).

procedure for automatically recording information for billing purposes on punched cards. It eliminates program cards and the cost of mailing them to subscribers. In addition, it periodically monitors reception to make sure that there are no faults in the transmission of programs to the subscriber's TV set.

The system is so flexible that through each headquarters unit it can service up to 150,000 subscribers. Potentially, it is capable of processing statements for millions of subscribers through additional headquarters units.

According to the present plans of Skiatron Electronics, it is expected that the telephone companies in the areas where the subscription service will be offered will wire lightweight coaxial cable to houses and apartments. A small electronic unit known as a Skiatron Transponder (Fig. 48) will be installed near the TV set. This Skiatron-designed device, which serves as the control unit for two subscription channels, a free public service channel and a high-fidelity music and stereo channel, also will actuate the central billing equipment so that the use of the subscription channels will be accurately recorded and monitored.

In Canada a system called Charge-a-Vision was announced by Charge-a-Vision International Ltd. of Toronto. In this system each subscriber is furnished with a unit which connects his television set to a cable feeding pay-television signals to the community. Two channels (A and B) of pay-programming are available. The home unit keeps a record of the elapsed time during which the unit is tuned to each of the two pay channels. There is a greater charge for each unit of time on one channel than there is on the other. The customer is able to read the elapsed time on his unit and on the basis of reading this, sends his payments to the system operators. In addition to the two channels of pay-programming, there is a third channel (C) which is used for special free programming. The normal charges for the A channel are $1 an hour and for the B channel $.50 an hour. The operators suggest that "total charges for any program can be varied, by showing first section on Channel A or B and the remainder on the free channel, C."

It has been announced that the Charge-a-Vision system is to be installed in Sault Ste. Marie, Ont. It is to be operated in conjunction with a community antenna television system. Subscribers, according to reports, are to pay the cost of the attachment which is approximately $40. In the Sault Ste. Marie installation there will be a charge for the CATV facility in addition to charges for the pay-programming which the subscriber elects to purchase.

Key TV, recently developed by TelePrompTer Corporation, is a cable distribution system for normal television receiver channels and community antenna service. Each viewer, however, can respond to special programming by pushing buttons on his own "viewer control." A permanent record of each response is immediately available at the system office for statistical review, grading, routing of marketing information, confirmation of program acceptance, and billing, if appropriate, through a national credit organization. Viewers who do not respond when :'acceptance" is required lose signal on that channel only. A tumbler-type key locks the control to prevent unauthorized use (Fig. 49).

Africa

There is not much progress to report in South Africa during 1960, other than the fact that several small film companies have sprung into being over the last few months, due mainly to the increased interest in African wildlife films by television stations throughout the world. Also, the Federated Rhodesian territories introduced television in November, 1960, and many one-man producers have sprung up in South Africa who supply TV stations with news, commercial advertising programs and some outdoor featurettes.

Television in the Union of South Africa is not expected in the near future, although a great majority of the public are in favor of it. It seems likely that it will take at least another five years before television transmitters are established in South Africa, if approved by the present Government.

One of the largest independent motion-picture laboratory services in South Africa, Irene Film Studios of Irene, just near Pretoria, suffered severe damages by fire during a lightning storm at the beginning of December, 1960, when close to $300,000 worth of equipment was destroyed. This means that many of the small independent producers, who obtained facilities at Irene Film Studios, such as the hire of motion-picture production equipment and laboratory services, have had to suspend their operations, or turn to overseas organizations especially for sound recording facilities.

Overseas film producers have become interested in South Africa, because of excellent climatic and lighting conditions. This year the film *The Hellions* was produced by an English organization, Warwick Film Productions Ltd., in conjunction with the local film producer, Jamie Uys Film Productions Ltd. Several overseas productions are also scheduled in the Union of South Africa this year, and arrangements are now pending.

The management of Van Riebeeck Film Productions, of Cape Town, has been taken over by advertising consultants and radio program producers. They have turned the facilities of this company to the production of advertising commercials for the Rhodesian television stations, where many South African manufacturers are advertising their wares.

In July, 1960, the rather severe import duty of 10d sterling per foot of sound motion-picture films was lifted in South Africa, allowing motion-picture films to be imported duty free, and several new film distributors have sprung up in South Africa. This has resulted in an increase in the number of cinemas, particularly the drive-in type which is becoming increasingly popular.

Equipment has just arrived in Johannesburg for the establishment of the first Cinerama cinema, which will open in March, 1961. It is expected to be very successful because Cinerama is virtually unknown in South Africa, which is always seeking a novelty. If the Cinerama cinema in Johannesburg is a success, this will be repeated in other important centers such as Cape Town and Durban at a later date.

British interests are financing South African film productions in the Afrikaans language for distribution in South Africa, and dubbed in the English language for world release. Most producers in South Africa, however,

devote their time to overseas television productions, in view of the world interest in Africa.

Argentina

The motion-picture industry in Argentina started in the early silent days when pioneers like Mario Gallo and Federico Valle did all the camera work, lighting, directing and selling. Production on a firm basis started around 1932 with the formation of Lumiton S.A. (not operating now); and a little later Argentina Sono Film S.A.I.C., now the largest producer of feature films, began operations. Other studios were then constructed: Emelco, San Miguel, Baires and a few smaller ones. These studios marked the beginning of the most active era of Argentina film production. At the end of the war, with the short-lived economic boom, further expansion occurred. However, various economic, business, and labor problems later brought production to a practical stand-still.

The revolution of 1955, and its subsequent change in official policies has brought about a sounder situation. Nevertheless, high production costs, decline in attendance because of higher boxoffice prices, TV competition, and failure to reconquer foreign markets are keeping production at a low level. The only studio continuing normal operations is Argentina Sono Film (four sets with 13,000 sq ft each, and a music recording set of 6600 sq ft; 1960 production 10 films). Other studios are San Miguel (five sets of 5000 up to what is claimed to be the largest in South America, 16,500 sq ft) and Baires Films (two sets of 13,000 sq ft each).

A large part of the actual production is made by independent producers (who own no studios) generally shooting in natural settings, with no reference sound at all, and post-sychronizing. A large concern, Lowe Argentina S.A.I.C., specializes in production and distribution of films for advertising. By far the largest in its field in Latin America, it produces 70 color commercials for theaters, and 20 black-and-white commercials for TV each month, including cartoons, puppets, general animation and live action. The firm employs 250 persons of which 110 are specialized workers and technicians.

A new activity of recent development is the production of cartoon commercials for the foreign markets, mainly the United States. Two small but fast growing enterprises, GB-Aries, and Producciones Garcia Ferre, are the leaders in this field. Other producing companies with varying capacity and equipment are being formed. There is no regularly scheduled production for TV, but the impression prevails that this may be expected in the future, due to the relatively low cost of production in this country and the prevalence of qualified technicians and general help.

American programs broadcast on local TV are usually sound-dubbed in Mexico and Puerto Rico. Complaints are arising about the "foreign accent" of these films, despite the efforts of its dubbers to speak in a neutral or "international" Spanish. Since every Spanish-speaking country has its own accent and idiom, there is no way of speaking Spanish in a completely satisfactory manner for everyone.

Laboratorios Alex S.A. leads locally in its field. Built in 1950, its standards compare favorably with the best international laboratories. Besides black-and-white, it handles Ferraniacolor, both Agfacolors (East and West German) and lately Eastman Color. This is the only color (motion-picture) laboratory in Argentina. Services include anamorphosing, de-anamorphosing, reductions, sound-recording facilities, etc. Its main equipment includes: two 35mm developing machines for Eastman Color; two for 35mm Ferraniacolor or Agfacolor; four for 35mm black-and-white negative and positive; two for 16mm black-and-white negative and positive; four rapid processing machines for 16mm TV services; two optical printers (one of them a Truca-Debrie); 14 black-and-white and three color printers (Bell & Howell and Debrie). Reduction printing to 16mm is done with Depue, Debrie and Union equipment. The laboratory also possesses 32 cutting and editing rooms fully equipped, which are rented to individual producers. Laboratories Tecnofilm is devoted mainly to release printing black-and-white 35mm and 16mm film. It also has a sound recording studio, 35mm and 16mm, and handles anamorphosing and de-anamorphosing, 16mm reductions etc. It plans to install color processing in the near future.

Production equipment in Argentina is mixed European and American, with some of local manufacture. Electrical current is 220 v, 50 cycles. Raw stock is of diverse origin. In 1958, 32 feature films were produced (10 in color); in 1959, 23 were produced (2 in color) and in 1960, 32, of which 5 were in color.

Argentina (total population 20 million) has about 2000 35mm cinemas. Some of these close in summertime, and some operate only on weekends. In Buenos Aires, there is one Cinerama Theatre. About eleven theaters are equipped with 70mm projectors, but few films are available. Projectors, 35mm, complete with sound and of a reasonable quality are manufactured locally in small quantities. Most equipment is still imported. Parts and repairs are almost all made locally.

Argentine television operates with 625 lines. Stations operate on a commercial advertising system, as in the United States. Films are projected at 25 frames/sec. The first TV station, Channel 7, was inaugurated in 1952. In mid-1960, Channel 9 was inaugurated and later Channel 13, all in Buenos Aires which has a population of 5.5 million and an estimated total of 650,000 TV sets. By the end of the year, Channel 8 was inaugurated in Mar del Plata, which has an estimated 10,000 TV sets and is growing fast. Stations are being built in Mendoza, Córdoba and Rosario. In January, 1961, the government called for bids for 26 more channels and secondary stations in inland cities. Practically all receivers are locally assembled, using an increasing proportion of locally manufactured parts, which reaches 90% in some makes. An average of 100,000 sets were built in 1960 using about 20,000 locally manufactured picture tubes, made by Capehart, Philips and Sylvania. Channel 9 has two video-tape recorders; Channel 13, two; Mar del Plata, Mendoza, one each.

On an average, 35% of the TV programs are films, most of them produced in America. American feature films are seldom used. Since political and economic conditions are improving in Argentina, an upward trend is expected in the fields of TV and motion picture.

Australia — Motion Pictures

There is little progress to report for Australia in 1960. There is no local motion-picture producing activity. Overseas firms have, on occasion, when they were making feature films with an Australian theme, sent camera units to this country. But studio sequences, editing, sound-recording and printing continue to be done in Great Britain or the United States. Films produced locally are limited to a few shorts, educational or documentary, as well as commercials for the rapidly expanding Australian TV audience. Until lately even the TV film commercials have been imported from the United States but in 1960 the Australian Broadcasting Control Board prohibited the importation of American television commercials. This was done to help the local film people.

The advent of television in Australia, as elsewhere, has had a devastating effect on public cinemas. Approximately one-third have closed and theater buildings have been sold, while those that are left are finding difficulty in attracting satisfactory audiences. In 1960 there were signs that the violence of the impact was diminishing, although it is obvious that it has not yet spent itself. Hitherto, Australian television has been confined to the capital cities. In 1961, TV stations will be established to cover most of the populated inland areas with adverse effects on local cinema houses expected.

Australia is entirely dependent upon films received from overseas. Quality films attract capacity attendances. Par-

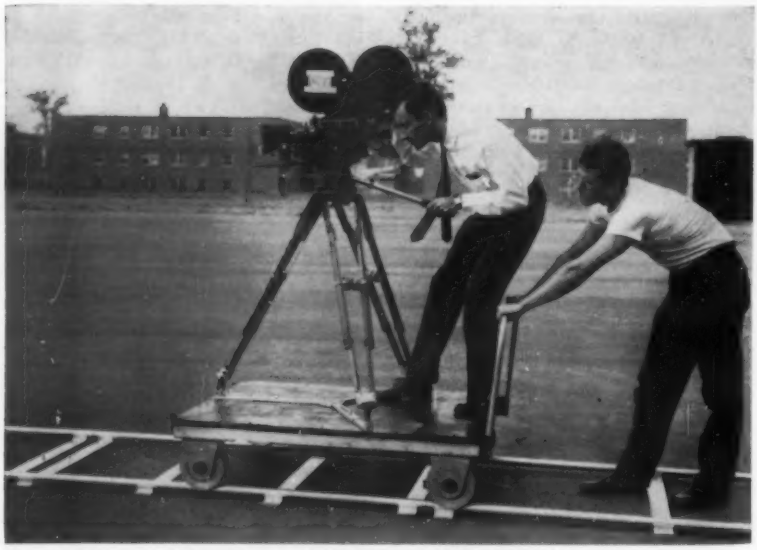

Fig. 50. Camera dolly and tracks (National Film Board, Canada).

ticularly is this true in the case of the spectacular, for example *Ben Hur*, *Spartacus*, and *South Pacific*, good comedies such as, *I'm All Right Jack* and outstanding features like *The Nun's Story*. There is no audience for the routine or the mediocre. Audiences insist on color and the wide-screen, even to the extent of obtaining assurances from the box-office before obtaining seats. The "old fashioned" small screen makes little appeal even when the quality of the film is high. The future pattern of the successful motion picture, as far as Australia is concerned, is clearly emerging.

Television has also seriously affected amateur motion-picture photography.

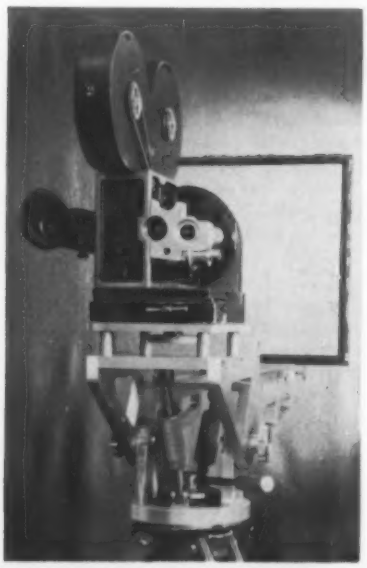

Fig. 51. Pan and tilt head for special effects (National Film Board, Canada).

The demand for 16mm cameras, projectors and film has almost ceased to exist, despite a fall in prices. This has been offset by the increase in price of Kodachrome film and other similar emulsions. Australians are now able to purchase Ansco, Gevaert and Agfa emulsions, as well as Kodachrome film. As against the collapse of the 16mm market, 8mm has shown a great increase. The price of 8mm equipment is now about half of what it was two or three years ago.

Australia now has two annual Film Festivals, one in Melbourne in May, and the other in Sydney in June. The Melbourne Festival has proved increasingly successful, both financially and in attendance. Films are now being offered by producers from all countries and the Festivals serve as a shop window for commercial exhibitors who use them to assess audience reactions. The Festivals enjoy capacity houses and function on a subscription basis which allows the importation of films for the purpose into Australia without the usual custom duties. The problem for the organizers is accommodation for the large crowds who seek membership.

The University of Melbourne has been probing during the last few years into the effects of films of violence on children and adolescents, and recent results are expected to be published.[166]

Australia — Television

The establishment of television services in Australia continued to expand during the year with the addition of Government noncommercial stations, operated by the Australian Broadcasting Commission, in State capitals of Adelaide, South Australia; Perth, Western Australia; and Hobart, Tasmania. In addition a commercial station commenced operations in Hobart.

This completed Stage II of the plan for the establishment of television in Australia, providing one Government noncommercial station in each State capital, plus two commercial stations in Sydney, Melbourne, Brisbane, and Adelaide, and one commercial station in Perth and one in Hobart. These stations provide a television service for more than 50% of the population of Australia.

During the year the Federal Government decided to implement Stage III of the plan for the introduction of television by extending television services to Canberra, Australian Capital Territory, and to 12 provincial and rural areas adjacent to the areas which are already receiving a service. Each area will be provided with a Government noncommercial service and, initially, a single commercial service for which licences have been issued to successful applicants.

It became evident from the rapid expansion and popularity of television since it was first introduced in Sydney and Melbourne in 1956 that the ten channels originally allocated for the service would be insufficient to meet present and future requirements. As a result the Australian Broadcasting Control Board invited the views of interested Government Departments, industrial organizations and television stations at a conference on technical matters associated with the expansion of television, after which it was announced that a total of 13 VHF channels would be reserved for television purposes. The five channels at present in use would not be disturbed but would be augmented by the availability of additional channels distributed through the frequency range 45 mc/sec to 222 mc/sec.

This year television receivers with 23-in. tubes were introduced and "transportable" receivers with 21-in. tubes gained popularity. The production of receivers with 17-in. tubes virtually ceased. The sensitivity of receivers was increased and the number of stages reduced by the use of frame grid tubes.

Canada — Motion Pictures

Cinematography: The Camera and Engineering Divisions of the National Film Board of Canada (NFB), Montreal, Quebec, collaborated on the design of a simple track camera dolly (Fig. 50). It is possible to lay tracks over the rocky bottom of a shallow stream and still achieve steady camera movement. A camera mount for use in aerial photography was also developed by the NFB to clamp onto the wing struts of an aircraft. The field of view is thus clear of such obstructions as Plexiglas windows, wings, etc.

Fig. 52. Electronic Timer for Special Effects (National Film Board, Canada).

Fig. 53. Portable synchronous sound recorder (National Film Board, Canada).

Special Effects: Since 1957 the NFB has been gradually developing equipment for special effects. One item is a new camera tilt and pan head for special effects (Fig. 51). The camera may be adjusted to give very fine vertical or horizontal movements as required. In front of the camera, on the head extension, is mounted an adjustable matte frame. This frame accommodates the piece of optical glass onto which is painted the matte or mask.

In special-effects work where a camera is photographing a film image from a projector, it is often necessary to vary the length of exposure on one unit or the other — frequently by different factors. Previously such an operation was done frame by frame manually, but a unit recently designed and built by the NFB has automated the procedure. The Electronic Timer (Fig. 52) produces alternating pulses which automatically control the camera and projector drive motors.

Sound Recording: A portable synchronous sound recorder - Nagra III Pilot-Tone (Fig. 53) used by NFB is an ultra-lightweight tape recorder, completely transistorized. It requires only ordinary flashlight batteries to power its drive motor and electronics. The audio amplifier chain includes a compressor which eliminates manual gain adjustments during interview recordings. Tape speed is kept constant by a very efficient servo system. Synchronization for motion-picture recording is accomplished with a separate control track head which is applied to the center of the $\frac{1}{4}$-in. tape approximately 90° displaced from the program recording.

The Technical Research Division of NFB developed a tape splicer to join $\frac{1}{4}$-in. perforated magnetic sound tape. Tests have shown that the splice causes no random signal when passing over the sound pickup head and critical motion of the reproducer is undisturbed by its passage through the machine.

The re-recording console of the National Film Board auditorium theater (Fig. 54) is capable of handling twelve program inputs. The mixing controls are arranged in two six-position assemblies with one master control for each position. Only the combined outputs of each position were available for the insertion compressor amplifiers, equalizers, reverberation devices and filters. To extend the usefulness of this equipment and to facilitate operations for the mixers, the Sound Division has modified this console by adding two auxiliary mixing channels, submasters and selector switches. This makes it possible to switch any desired combination of inputs to either the original master outputs or the auxiliary channels.

Background Projection: NFB developed a system to monitor the synchronization between the shutter of the camera and the background projector. A very slight mismatch in the opening and closing of these shutters will cause an objectionable flicker in the resulting picture. The new device consists of a commutator on the shutter shaft of each machine, so arranged that contact is made at every 180° of revolution. Contact is made alternately by each unit at equal time intervals and the two are wired in series to a battery and neon lamp. When the system is in perfect synchronization, the neon lamp is unlit. However, mismatching of the order of ±2° will set the neon lamp glowing.

Canada — Television

Canadian TV coverage has been increased by the addition of 12 new television stations and satellite stations. As a result of this expansion, Vancouver, B.C., viewers now have a choice of privately operated TV as well as the existing local Canadian Broadcasting Corp. station and several U.S. stations. Winnipeg, Manit., TV viewers now have privately operated TV and CBC's French language TV in addition to the CBC's existing TV outlet. Calgary, Alta., viewers have the choice of two privately operated TV stations. Additional outlets have increased TV coverage in Newfoundland, New Brunswick, Manitoba, Alberta and British Columbia.

The CBC's video-tape delay center has been transferred into new permanent quarters in Calgary. This installation

Fig. 54. Modification of mixing console (National Film Board, Canada).

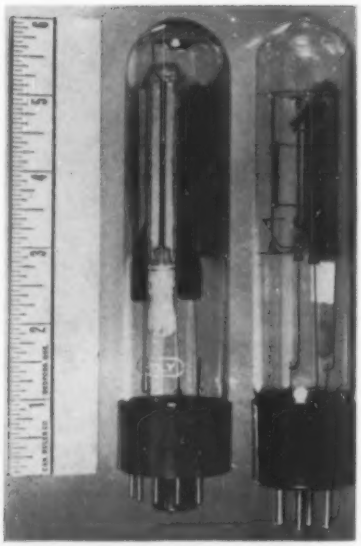

Fig. 55. Lectron tubes, front and rear views, Ecole Polytechnique, Montreal.

includes nine Ampex VR-1000A Videotape Recorders, two vidicon camera chains, four Eastman 275 Projectors and two slide projectors.

A network linking the new privately owned TV stations in eight of Canada's major markets is in course of formation. In December, 1960, the Board of Broadcast Governors granted to Spencer W. Caldwell of Toronto permission to form such a network which would include the new stations in Halifax, Montreal, Ottawa, Toronto, Winnipeg, Calgary and Vancouver. Included also is the existing station, CFRN-TV, in Edmonton where the CBC has permission to build a new outlet for the publicly owned system.

There are two unusual features in the proposed network; first, its capital structure permits the eight basic affiliates to purchase a 49% interest in the network company; and second, the network company will not construct or own any production facilities. Instead it will employ those of its affiliates who have invested $30-million-plus in plant and equipment in the past year and other existing commercial film and TV studios. It is expected that the network will begin broadcast operation in September, 1961.

A new electronic tube called the Lectron has been developed by Professor Jean-Charles Bernier and associates at the Ecole Polytechnique de Montréal for "reading" magnetic tape. For many reasons, such as tape and head wear, synchronizing difficulties, cost of equipment, etc., it would be advantageous to read the tape by purely electronic means, without the use of high-speed mechanisms.

The Lectron involves the action of the recorded magnetic fields of the tape on a sheaf of photoelectrons originating very close to the tape surface. The tube comprises a cylindrical glass bulb about 1-in. in diameter and 6 in. long (Fig. 55). Midway and parallel to the length of the tube is a narrow slot about $2\frac{1}{2}$ in. long by 1 mm wide. Over this slot, in the form of an outside convex ridge is a nonmagnetic metallic membrane sealed to the glass bulb, and extremely thin at its apex (50 μin.). The magnetic tape slides at low speed (15 in./sec) in light contact with the apex of the membrane and each crosswise recorded tape line comes in lengthwise contact along the membrane. Thus, the magnetic tape is separated from the photoelectric surface of the inside of the membrane by about 50 μin., which is about one-third the smallest recorded video dipole on the tape.

An electrooptical system focuses a tiny spot of light on the photosensitive surface and this spot is swept along the membrane at the proper scanning frequency. Thus, a very small and precise sheaf of slow photoelectrons is liberated at one spot on the cathode where it is deflected by the field of the particular dipole immediately behind.

One important application of the Lectron will be the editing and monitoring of recorded video programs which cannot be conveniently done with conventional systems. For editing, in particular, it permits visual observation on a cathode-ray monitor tube of any video field while keeping the film stationary and without wear of the tape.

A new circuit has been devised to avoid the changes in picture size and brightness which normally occur in a television receiver when the a-c line voltage changes. In receivers which incorporate this circuit, the negative bias of the horizontal driver tube is obtained from a tap on the flyback transformer by means of a Voltage Dependent Resistor (V.D.R.) circuit. An increase in sweep amplitude thus produces a larger negative bias which reduces the horizontal drive and, therefore, tends to reduce the sweep. The Vertical Output Sweep tube is similarly biased by a voltage obtained from its own plate circuit. With a suitable grid drive waveform in this tube, variations of d-c grid bias are able to control the sweep amplitude without disturbing the linearity.

This circuitry has the advantage that when the picture size is set at normal line voltage a full-size picture is still obtained at 105 v, while at 129 v very little overscan occurs and the full

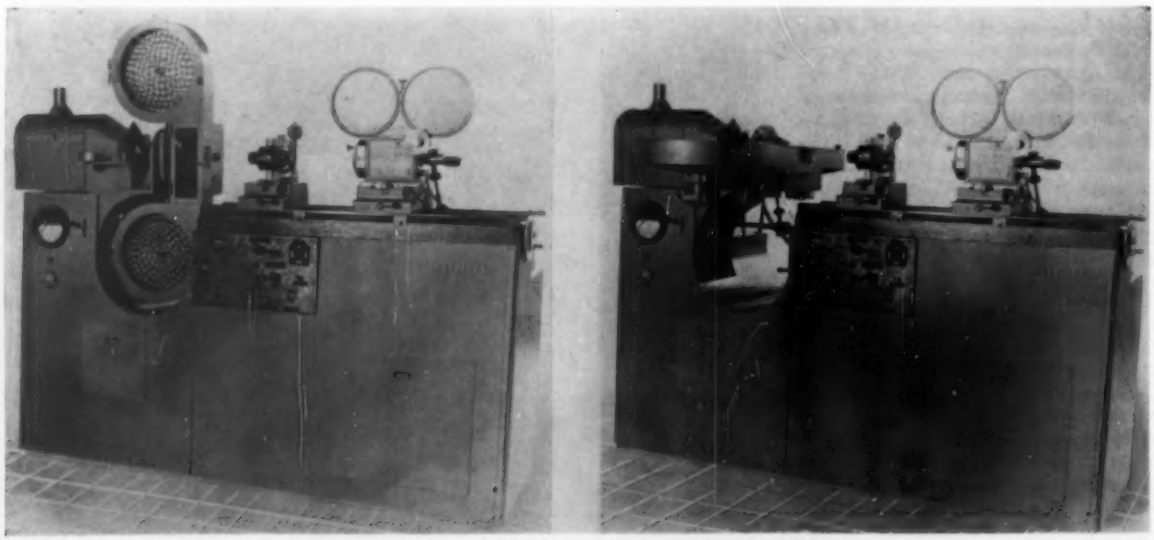

Fig. 56. Multirex printer with negative carrier in vertical (left) and horizontal (right) positions.

picture area can still be seen. The brightness (and high voltage) remains quite constant over the full range of line voltage and "blooming" at high brightness settings is reduced. In addition, due to the constant voltages and dissipation in the sweep circuits, there is a substantial increase in reliability.

Colombia

The year 1960 represented an advance in quantity and quality of professional motion-picture production. Besides the newsreels of national events that have been produced for several years, there are other films of long footage being made with plots, settings, and native artists. The most notable films of long footage produced in Colombia during the year were: *Oceans of Passion*, *This Was my Sidewalk*, *Carmentea*, and *The Amazon Piranas*. With the production of these films, the private motion-picture companies started a new era within their own industry. The leading companies who have their own laboratory equipment for mounting and editing are: Panamerican Films, Cinematografica Colombiana, and Roquilfilm. The laboratory that is best equipped is Cinematografica Colombiana. The company that produced the largest number of newsreels and long-footage films was Panamerican Films.

It is worthy of mention that the Colombian Insurance Co. produced a series of newsreels for some television programs and theaters. The production of these newsreels was at first carried out by Raymond Windmiller and, after his death, by Luis Cuesta, one of the earliest pioneers among Colombian camera and laboratory men.

It seems that production of professional motion pictures is about to become a new industry in this country. The films produced up to now have had several technical and artistic defects. This is mainly due to the lack of people sufficently prepared for motion-picture production. This deficiency has been partially solved by hiring foreign personnel with experience in this kind of work. This is also true with respect to artists. The producers of professional motion pictures are trying to obtain from the Government the necessary aid to strengthen their industry. If help is procured, one of the measures will be that of sending young men to countries famous for motion-picture productions to learn the technical aspects of production.

In Colombia, television is in the hands of the state. There is only one station and this station broadcasts programs by way of three different channels to cover the various zones of the country. This installation utilizes modern equipment of American and European manufacture and the station has large studio facilities. A department of the national television is devoted to the production of motion-picture films for use in TV programs. This organization is separate from the TV stations and has modern equipment for filming and processing of 35mm and 16mm film.

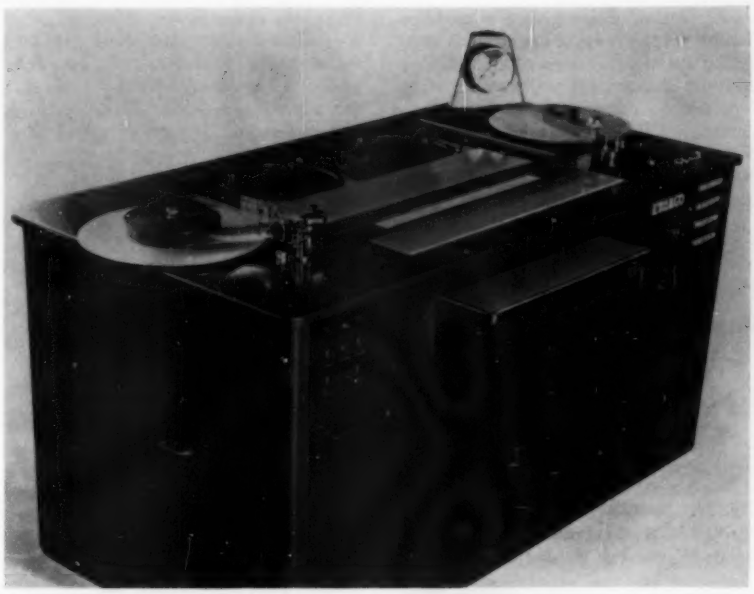

Fig. 57. Etalco automatic color timer.

One new aspect of national television production during the last few months of 1960 was the beginning of film productions for educational purposes only. Educational films have been designed to meet the needs of Colombian people; this one aspect will increase considerably the motion-picture laboratory work and will provide employment for new technicians. During 1960, TV film recordings were made for the first time since television was introduced in Colombia. These films are used to rebroadcast some programs; but it is also of interest that such recordings are being used for educational purposes. The recordings are duplicated and projected throughout the country in regular 16mm projectors. These programs will be made available to all public schools of the country, even those in the most distant places.

In this country, 8mm film, and to a large extent 16mm film, have been confined to amateur use. There has not been much of an increase during the year due to Government restrictions on importation of various kinds of equipment for using these films. It is to be noted, however, that almost all the amateurs are now using color film instead of black-and-white film. This year Agfa installed in Bogota the first laboratory in the country for providing processing service for their 8mm and 16mm color reversal film.

France

A printer called Multirex is being introduced by the S.A.M.O.P.R.A. Co. (Fig. 56). This machine is able to print horizontally-running negatives onto vertically-running positives in 35mm or 70mm. It can also print 65mm onto 70mm film and reduce 65mm to either 35mm or even 16mm film.

An Etalco automatic timer for color films was introduced by the same company (Fig. 57). This instrument, especially designed to reduce scratching, can be used with either 35mm or 16mm film without any mechanical changes. It does not require a skilled operator. There are two possible ways the instrument can be used. One method consists of making a preliminary timing with a

Fig. 58. The Scopitone, a 16mm "jukebox" projector.

set of neutral filters giving a medium density print. A second operation is then performed with a series of color filters, with the numbers of the gray scale being recorded on the pilot strip, which thus determines the exposure time for each scene. The second method of timing may be used when the negative is sufficiently uniform. Then it is sufficient to make a single timing for about 30 frames, using a neutral density corresponding to the value of the negative and the whole gamut of the color filters. This method is faster and uses less print stock.

Fig. 59. Soundhead unit for Magnetocord 16 M/R with center and edge-track heads (Siemens & Halske).

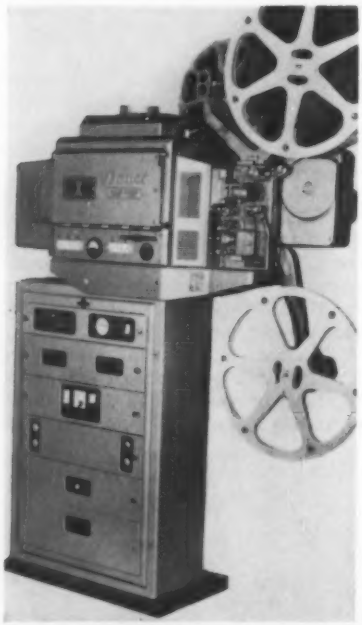

Fig. 60. Bauer Selection II O 16mm double-strip projector.

An interesting device called the Scopitone has been introduced by the C.A.M.E.C.A. Co. (Fig. 58). This machine resembles a jukebox but projects 16mm sound film when a coin is inserted. As many as 36 different pictures can be selected. The projector used is a continuous running type.

Pyral, S.A., Créteil (Seine), manufacturers of magnetic striping equipment, introduced some new developments in the substandard field. Their double-eight striping machine is now equipped with film elevators on the feed side, as well as on the take-up side, for continuous operation in raw-stock striping. A new magnetic control device, which has no contact with the film, gives the operator an audible signal in case the thickness should deviate from the standard. The signal also indicates the adjustment required to correct the situation. Longitudinal orientation of the oxide particles is achieved by a new device, which also degausses the stripes once the particles are oriented.

Germany — Motion Pictures

There have been no outstanding new inventions or applications of new equipment or systems in the field of motion-picture techniques in West Germany in 1960. However, there have been numerous improvements, especially in projection machines, concerned with automation and time-saving devices, such as the use of xenon lamps and automatic operation devices. There have been some improvements in 16mm sound recording and 16mm studio projection equipment and in the application of transistors in power amplifiers. A review of 8mm equipment of world-wide origin has been published.[107]

The application of film cameras combined with electronic view-finders, electronic monitors and a remote control system (a German version of the Electronicam system) is now available in Germany and is in successful operation for TV film production. The equipment was produced by three companies — Arnold & Richter KG supplied the cameras, Fernseh GmbH provided the electronic part of the system (vidicon viewfinder and monitors) and Siemens & Halske AG made the remote-control system for the cameras, the sound equipment and the intercommunication system.

The 16mm Magnetocord 16 M/R recording machine, produced by Siemens & Halske AG, is now available for 2-channel magnetic recording and reproduction on 16mm film. The machine can be hand-operated or driven by a Rotosyn synchronous system in connection with other equipment such as a reproducer or a projector. The exchangeable soundhead unit contains the recording, reproducing and erasing heads (Fig. 59).

Eugen Bauer GmbH offers a 16mm double-strip projector, Bauer Selection II O with a wide range of applications for studio demands (Fig. 60). It can be used for magnetic sound recording and reproduction with an edge track on the print or with a center track on a separate magnetic film. It can also be used for optical sound reproduction. The projector has forward and reverse drive, a Maltese Cross intermittent movement and automatically circulating lubrication. A 900-w xenon lamp provides a light beam of approximately 1800 lumens, 25% less at the edges. The capacity of film is 4000 ft for prints and 2000 ft for the separate magnetic sound-film.

Siemens & Halske AG produces a communication system for studio personnel, consisting of a 2-w transmitter with a quartz controlled fre-

Fig. 61. Siemens & Halske receiver for studio-communication system.

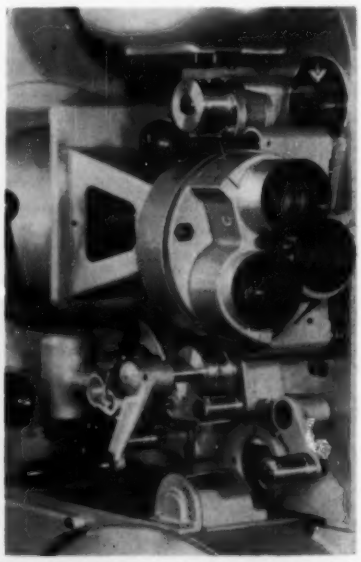

Fig. 62. Frieseke & Hoepfner GmbH lens turret for projectors.

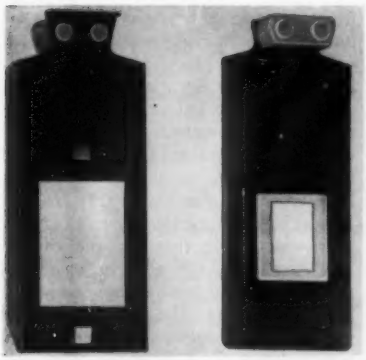

Fig. 63. Frieseke & Hoepfner GmbH interchangeable gates for various frame sizes.

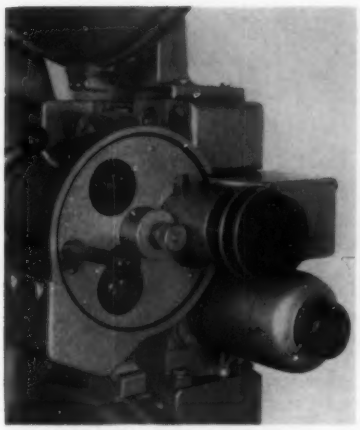

Fig. 64. Zeiss Ikon lens turret for projector Ernemann VIII B.

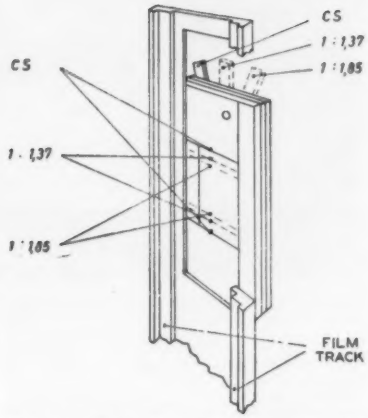

Fig. 65. Zeiss Ikon projector gate for three different frame sizes.

quency of 16.68 kc operating on a loop system in the studio floor connected to the transmitter. Six channels are available by the use of the 3rd to 8th harmonics. Pocket-size receivers with earphone-clips are fed by 2.4-v nickel cadmium batteries (Fig. 61).

The automation of many operations previously done by hand by the projectionists is now often accomplished by the use of mechanical devices, especially since many medium-sized theaters have installed xenon lamps. Several companies offer revolving heads and corresponding projector gates for the various lenses needed for the screening of the different film sizes now in use. The operation of the revolving lens turrets and the corresponding gates can be done by hand or with the aid of a remote control or by automatic devices.

Frieseke & Hoepfner GmbH has a revolving lens turret for their projection machines and easily interchangeable gates for the different frame sizes, which must be inserted by hand (Figs. 62, 63). Zeiss Ikon AG offers a revolving lens for their Ernemann VIII B projector and a gate for three frame sizes. The changeover can be done by hand or by remote control (Figs. 64, 65).

The Philips pulse discharge lamp SPP 800 is now available for Philips projectors of the types FP 5, FP 6, FP 56 and FP 7 to replace arc lamps up to about 50 amp. The new lamphouse EL 4465 is very small and similar to the one used on the projector FP 20S (Fig. 66). It contains a turret with two lamps for automatic changeover to the standby lamp.

A fully transistorized 30-w amplifier is produced by Zeiss Ikon AG. Its technical data and its size are identical with the data of the 15-w tube amplifier. So, it is possible to exchange the amplifiers in the existing racks or cabinets to achieve double output per unit.

West Germany — Television

Several broadcasting stations in the Federal Republic of Germany, such as Baden-Baden, Frankfurt and Stuttgart, have started to build larger TV studios. New construction directives were discussed with the industry (Fernseh GmbH Darmstadt) to achieve uniform equipment for these new studios. A flexible DIN rack-mount-technique will be used, which allows changing defective equipment in a very short time. Worth mentioning also is the further transistorization of studio equipment, for example, a studio pulse generator for a 625-line standard, a distribution amplifier for video signals, and a differential equalizer for increasing the amplitude of high video

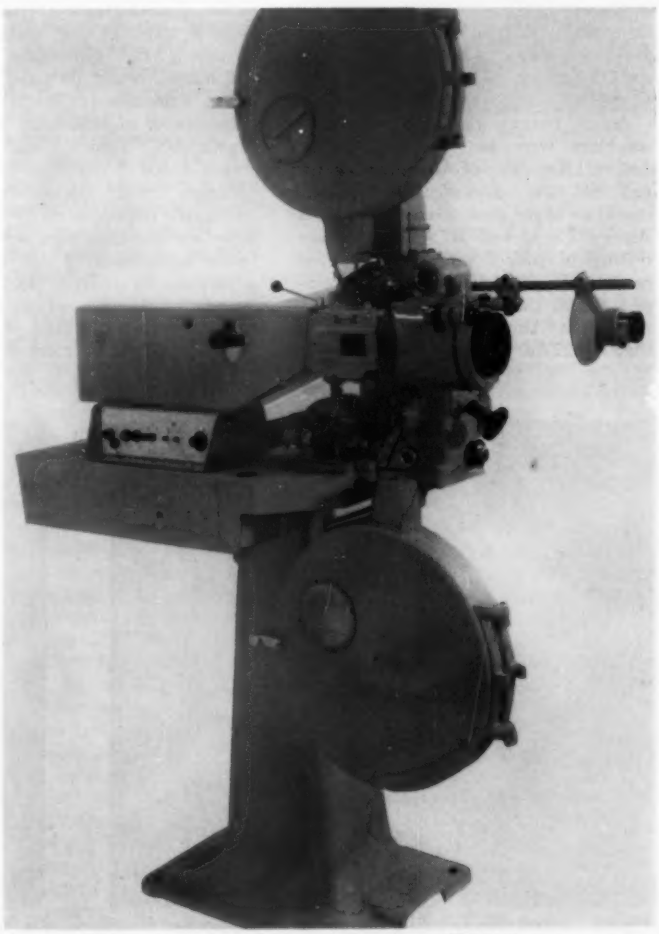

Fig. 66. Philips projector FP 56S with lamphouse EL 4465.

Fig. 67. Transistorized differential equalizer, IRT, München.

frequencies without phase distortion (Fig. 67).

The increasing use of image orthicons in the studios can be mentioned. The 3-in. tubes were improved by Fernseh GmbH, Darmstadt. The depth of modulation at the center of the picture obtained with a 5-mc test pattern is about 60%, related to 0.5-mc (cameras of type KOD). Nevertheless, studio people are interested in the $4\frac{1}{2}$-in. tubes because of the high picture quality, especially in connection with the increasing use of video-tape recording equipment. Image inconoscope tubes were improved by using multialkali photocathodes of higher sensitivity (about 150 μamp/lumen), specially improved in the red spectral range.

About twenty video-tape recording machines were in operation in the Federal Republic of Germany at the end of 1960. Included are several machines of the most modern type from Ampex Corp. and RCA, the picture quality of which has been improved considerably in 625-line standard, compared with the older types. Intersync-equipment (Ampex)[108] for synchronizing the machines with the studio pulse generator is already in operation at some studios. The use of magnetic tape for prerecording has increased considerably in 1960. Nevertheless, the picture quality obtained was rather indifferent and, especially with the older machines, not always satisfactory.

Because of the introduction of the new rack-mount-technique, and the increasing use of video-tape recorders, a number of measuring problems had to be solved. Accordingly, the following instruments were constructed: (1) a device for measuring the amplitude and phase characteristics (Fernseh GmbH, Darmstadt); (2) an instrument for measuring the differential gain and differential phase (Wandel & Goltermann, Reutlingen); (3) a standard level generator of high stability (Siemens & Halske AG, Munich); and (4) several transistorized test-signal generators (Fernseh GmbH Darmstadt). Furthermore, new requirements for picture and waveform monitors were worked out for better supervision of the video signal generation in studios (IRT Munich), especially with respect to the correct reproduction of the black level and the visibility of phase errors of horizontal frequency, normally observed as "jitter" on the screen of home receivers.

During the last year no great inventions have been made in the field of TV film technique. However, the results of past research were introduced into studio practice. For instance, the film measuring instrument mentioned last year (see also the 1959 Progress Report in the May 1960 *Journal*) is now in production so that TV studios and film producers are able to test films under equivalent conditions, corresponding to TV usage. The optimum quality of TV film, considering density range and gamma, is well known and TV studios and film producers are generally following the recommendations which have been worked out. The pilot frequency technique (see also the 1957 Progress Report in the May 1958 *Journal*) with HF-bias for synchronization of unperforated magnetic tape with the picture film is now universally in service.

For the production of TV films a new system was introduced at the Bavaria-Atelier GmbH, Munich, which is similar to the American electronic system, discussed by Dumont in 1956.[109] In cooperation with Arnold & Richter KG, Munich, and Fernseh GmbH, Darmstadt, a camera unit was developed, consisting of an Arriflex 300 with attached vidicon KUV 100/10. Because of optical and mechanical reasons a vari-optic is used. An optical separation of the light flux in the viewfinder system enables the camera operator to judge the quality of the picture. At the same time, the light flux for the vidicon is sufficient to give a monitoring picture of satisfactory quality to the director. Arrangements are made which facilitate the film editing process by means of synchronizing signals on the films of the three cameras and the sound recording.

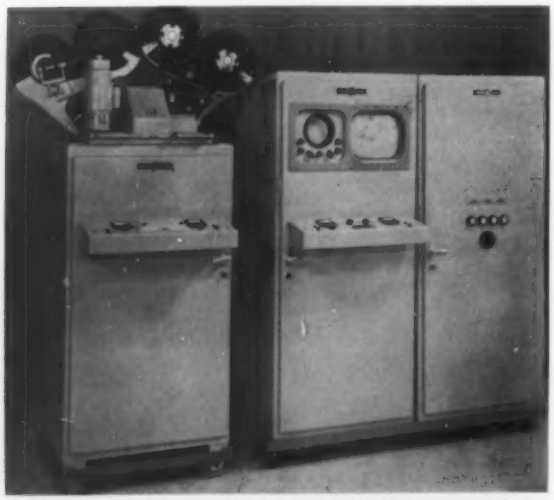

Fig. 68. 35mm cinerecording equipment for suppressed frame method, Fernseh GmbH.

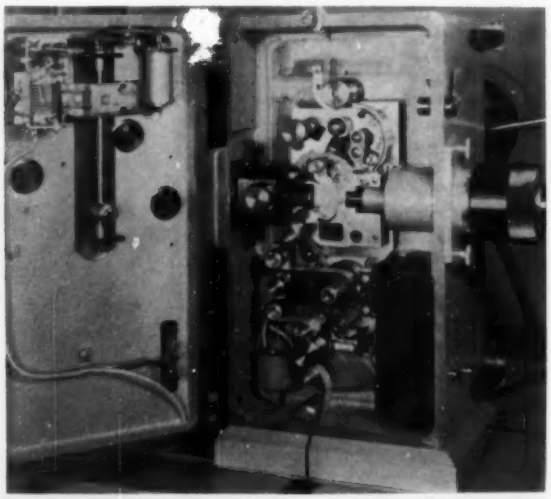

Fig. 69. Pneumatic fast pulldown mechanism for 16mm film scanner, Fernseh GmbH.

Because of this, the editing can be done immediately after the processing of the films, in accordance with the ideas of the director.

This system has shown good results in practice because it works similarly to a TV transmission with respect to flexibility and control possibilities while achieving the picture quality of a 35mm film. A number of films have been produced which were well received, not only because of artistic content, but also because of technical quality.

The quality of 16mm film recording does not meet present TV requirements. This is the reason for introducing new machines for 35mm film recordings (Fig. 68), as well as video-tape recording. The picture quality obtained is more satisfactory due to the larger area of the 35mm film although, because of the applied suppressed frame method, the solution in the vertical direction is limited by the decreased number of lines.

At the Convention of the Fernsehtechnische Gesellschaft in Stuttgart in September, 1960, a new film scanning device was presented (Fig. 69). This is a pneumatic fast pulldown mechanism for 16mm film which transports the film within 1.2 ± 0.1 msec during the vertical blanking period. So, for film scanning (25 frames/sec), a simple flying spot scanner can be used without the necessity of a complicated twin optic system or shrinking compensation. The laboratory model showed very good picture steadiness even with spliced films, but the delivery of the first production models will not be made for some time.

The number of TV licenses reached 5 million at the end of 1960. For the intended broadcast of a second TV program, more transmission lines and transmitters will be put into service by the Deutsche Bundespost. For the same purpose new transmitters were ordered by some broadcasting stations. The standard converter equipment (Fernseh GmbH, Darmstadt) mentioned last year (see also 1959 Progress Report in the May 1960 *Journal*) has been improved so that even the conversion of TV standards of different vertical frequencies is possible. Variations of signal amplitude, periodically occurring, are reduced by an automatic control circuit to values $<1\%$.

Continuing the planning and development work for color TV in the future, further investigations of well known transmission systems (NTSC-system and SECAM-system) were carried out by FTZ, Darmstadt, and IRT, Munich. A special section of IRT dealt with a system in which the color subcarrier is modulated simultaneously in amplitude and frequency (FAM-system). Fernseh GmbH continued the development of color television studio equipment. As a control unit for monitoring the colorplexer, a "vector-scope" is now available which is installed together with the modulator in the same rack (Fig. 70).

Industrial television use has increased further. A fully transistorized vidicon camera (Televisor, Fernseh GmbH., Darmstadt) was constructed using the printed circuit technique and has many possibilities for interesting combinations in practice. Closed-circuit equipment for the transmission of films and details of life on board oceans liners, as well as the installation of Telescheck equipment for faster cashing of checks for car drivers may be mentioned as especially interesting examples.

Great Britain — Motion Picture

With the close of 1960, cinema attendances were showing a slight rise over the previous year and this may indicate a gradual return to more cinema-going in the future. Unfortunately cinemas are still being closed down, although in some newly developed areas, new cinemas have been built.

Film production has risen slightly over the previous year, about 95 feature pictures having been produced. Two studios have been lost to film production, the British National Studio at Elstree, and the Teddington Studio, formerly used by Warner Bros.; both studios have been converted and equipped with the latest facilities for TV production, both live and taped.

There has been a steady increase in 16mm film for industrial use. The sales of 8mm equipment in the amateur field indicate considerable progress. Lower priced cameras and projectors are now available, and developments in 8mm sound are on the way.

Lenses and Cameras: The first commercial use of Taylor, Taylor & Hobson's dual range zoom lens, Varotal III,[110] was made at the wedding of H.R.H. Princess Margaret and Mr. Antony Armstrong Jones in May, 1960 (Fig. 71). It brought to millions of viewers a live program of scenes that, until recently, could have been seen by only a select few. The use of these zoom lenses by both ITA and BBC in Westminster Abbey provided viewers with intimate close-ups of the whole ceremony. Varotal III has two overlapping focal ranges of 4 in. to 20 in. (100mm to 500mm) and 8 in. to 40 in. (200mm to 1000mm). This lens also forms the optical system of a combined zoom camera where the image is reflected onto the face of an orthicon tube which lies parallel to the lens. This camera was developed jointly by the BBC and Taylor, Taylor & Hobson. Further development of the Studio Zoom lens, Varotal II, has resulted in a remote servo controlled package for this lens, in which zoom, focus and iris are all remotely controlled (Fig. 72).

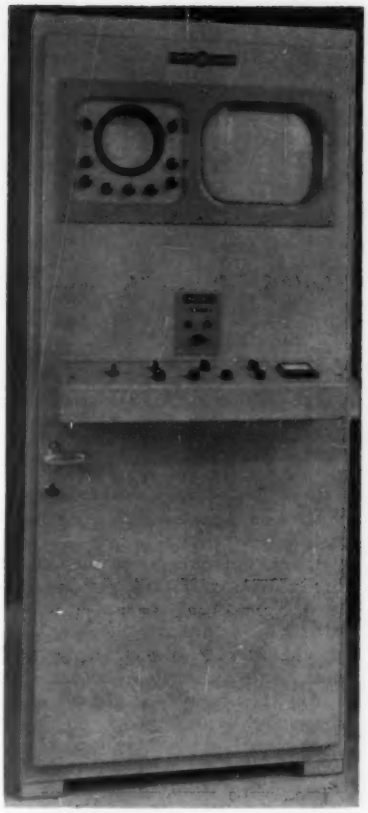

Fig. 70. Colorplexer with vector-scope, Fernseh GmbH.

Zoom lenses originally designed for 16mm cameras are being used extensively on the Continent, and to a lesser extent in Great Britain, for industrial vidicon cameras and for crowd work where the lighter weight, wider aperture, or other features outweigh the disadvantage that the lens may not fully cover the entire expanse of the vidicon field. Film Surveys Equipment Ltd. have produced a specially lengthened viewfinder for a 16mm zoom lens which enables it to be used with most makes of vidicon cameras (Fig. 73). This extension is also extremely practical for professional 16mm work, since it enables a blimp or an all-weather cosy to be fitted round the camera with plenty of throw for the eyepiece to stick well out at the back.

The latest Technirama lightweight camera is now available with an underwater casing developed by Technicolor Ltd., England, in association with Siebe, Gorman (Fig. 74). Including camera and film, the unit weighs 400 lb and is completely hydrostatic, so that it can be maneuvered for underwater tracking shots at reasonable speeds in all directions. It is operated by side handles, one of which has a twist-grip focus control. The focus setting is marked on an illuminated dial below the viewfinder.

Fig. 71. Varitol III Zoom Lens, Taylor, Taylor & Hobson.

Fig. 72. Remote servo lens drive unit assembled to Varotal II Zoom Lens.

In the air, both standard and lightweight Technirama cameras have been fitted into a helicopter (Fig. 75).

An interesting camera introduced at the Fifth International Congress of High-Speed Photography, sponsored by the SMPTE in Washington, October, 1960, was the Barr & Stroud High Speed Film Camera, which is capable of making 117 exposures at the rate of 8½ million pictures per second.

Sound: The introduction of transistorized camera sound recording equipment has been delayed for reasons relative to production facilities. However, a magnetic recording adaptor for use with striped negative in the 16mm Arriflex camera has now been supplemented with the Type 1830 recording unit, comprising the basic film transport mechanism, with its associated controls. Together with the Type 1691 amplifier, these provide a very compact and lightweight recorder for use with any camera having synchronous motor drive. E.M.I. Sales and Service Ltd. have now produced a transistorized version of the L2/B battery-driven portable magnetic tape recorder which has been very much used for the recording of wild sound effects, especially in difficult locations.

The introduction by Kodak, early in the year, of 16mm Ektachrome commercial reversal color stock and the new duplicating stock 5359, which carries a silver sound track, to replace the old Kodachrome stock with its dye track requiring a direct positive recording, caused a revolution in the 16mm recording world. The low gamma of the 5359 track caused some initial trouble, with sibilance and noise, but indications are that a reasonable track can now be obtained.

One deficiency in equipment from which the 16mm producer has suffered has been made good by the recent production by Rank Precision Industries Ltd. of a stand fitted with additional take-ups to enable separate optical or magnetic tracks to be run on Bell & Howell 16mm sound projectors.

The advent of one or two 8mm projectors with facilities for reproducing a magnetic striped track has led to a limited call for recording in this gauge. This has been done by re-recording the 35mm master at 45 ft/min and using this track, running at 90 ft/min, to duplicate on the edge-stripe on double-run 8mm stock in a normal 16mm recorder.

Rank Precision Industries Ltd., Studio Division, has produced a new "2000" Series of Cabinet 16mm Magnetic Sound Recorders, 24 or 25 frames/sec, of improved performance with 2400-ft capacity, fast rewind and automatic braking to prevent film spillage. A "1500" Series Cabinet Model has been developed as an "Auto Sync Shift" machine for facilitating editing of COM/MAG films. The sound is automatically lifted, erased and re-recorded level with the picture action to simplify and speed up editing. The film is then re-run through the machine to reverse the process, bringing the sound to the correct "sync" distance.

Editing Equipment: Acmade Ltd introduced a Mark II Editing Table[11] with many unusual features, making it particularly useful for television film editing. Pushbutton controls are located on the table top for forward, instant stop and reversing at 25 ft/sec. The front film path is for picture and combined optical or magnetic sound, and the rear path for separate magnetic (edge and center track). The picture is projected onto a screen approximately 8 by 6 in. in size, with a suitably cooled 250-w projection lamp.

Also introduced in 1960, was a new bench-type splicer known as the Acmade Tungsten Precision Splicer (Fig. 76). This moderately priced splicer incorporates the precision features essential for the accurate joining of optical and magnetic striped films. Models are

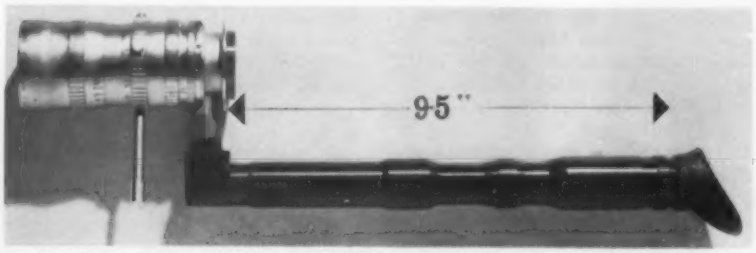

Fig. 73. Lengthened viewfinder for 16mm zoom lens, Film Surveys Equipment, Ltd.

Fig. 74. Underwater casing for Technirama lightweight camera.

Fig. 75. Standard and lightweight Technirama cameras mounted on helicopter.

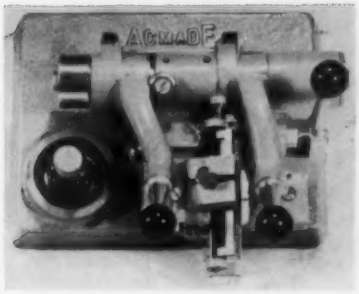

Fig. 76. Acmade Tungsten Precision Splicer.

made for 16mm, 35mm or combined 16/35mm.

Laboratory Equipment and Processing: Newman & Guardia Ltd. have introduced additional items of processing machinery, one of which is the Lawley Junior 16mm Sprocket Driven Reversal Film Processing Machine (Figs. 77 and 78). The Lawlette film processing machine has been designed to meet the requirements of the producer whose output of film does not justify the expense of large installations. The same standard of quality can be obtained but the output is approximately one-tenth that of the Lawley Junior. These machines are suitable for processing normal film stocks, microfilm, x-ray film, oscilloscope film or paper tracings.

The Lawley film waxing and cleaning machine has been demonstrated. The principle of this machine is to pass film rapidly into a reservoir of liquid consisting of a wax suspended in a volatile solution such as trichloroethylene. An interesting instrument designed for the measuring and comparing the color of surfaces when illuminated by visible or ultraviolet light has been made available by Baldwin Instrument Co.

As an aid to producers who wish to use Technirama photography in countries where Technicolor laboratory services are not available locally, Technicolor Ltd., England, has produced an anamorphic optical printer complete in its own mobile printing room in the form of a caravan trailer equipped with all necessary services including liquid printing (Fig. 79). The firm has also announced a new service of "Auto-Opticals" by which dissolves, fades and other special effects can be produced in release prints without the use of intermediate dupe negatives and without cutting the negative in two separate reels in A & B form (Fig. 80).

During 1960, 35mm release prints using dye transfer sound-tracks of improved quality have been manufactured by Technicolor for a number of issues of the weekly magazine *Pathe Pictorial*. A variable-area positive image is recorded directly onto matrix stock from the magnetic master and this matrix is used to transfer a high-definition grainless track image onto a mordanted gelatin-coated blank film containing no light-sensitive photographic emulsion whatever. The picture image is the regular Technicolor three-color dye transfer print. In addition, the first electronic color film analyzer in production use in Europe has been installed in Technicolor's laboratories in London; this is an Aga-Hazeltine analyzer made under a license issued by AGA Svenska AB of Stockholm.

During the year, the first rapid film processor built by Kelvin & Hughes Ltd. was put into service at Newmarket

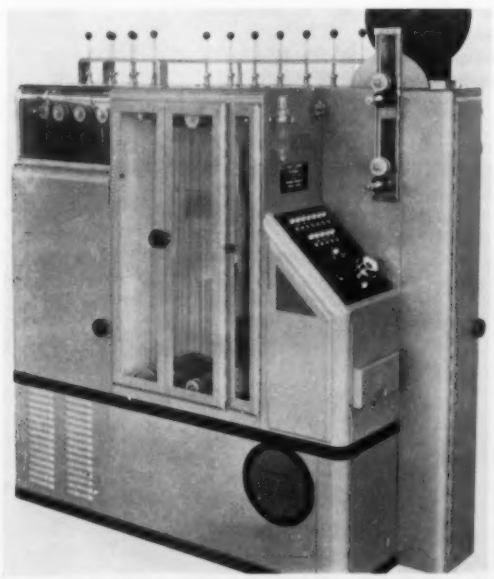

Fig. 77. Lawley Junior 16mm processor, Newman & Guardia, Ltd.

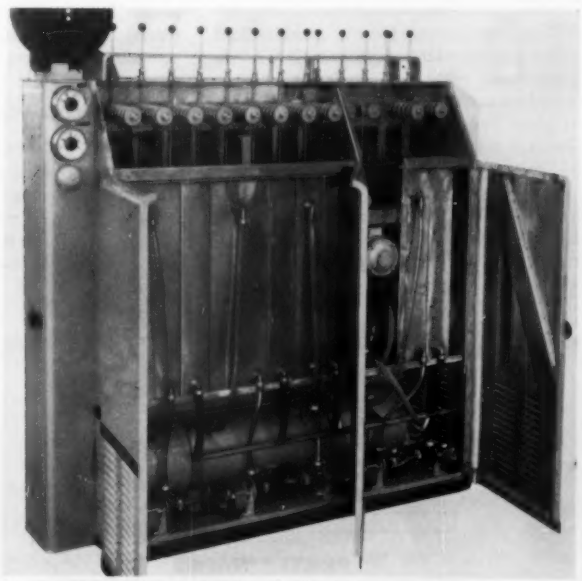

Fig. 78. Back view of Lawley Junior 16mm processor.

Fig. 79. Mobile printer, Technicolor, Ltd.

Race Course. There are two models, each providing a simple, reliable method of high-speed, rapid-access, high-quality processing of exposed film. The 35/70 RP1, intended essentially for negative processing at a film speed of 10 ft/min, has a dry-to-dry processing time of 30 sec and is designed for use with either 35mm or 70mm film. The 16/35 RP1 model has a film speed of 40 ft/min with a dry-to-dry processing time of 60 sec and is suitable for either negative or positive processing using 16mm or 35mm film. The film feed and complete processing are automatic and once through the processor the film is ready for immediate viewing or projection and forms a permanent film record.

Theaters: During 1960 a considerable theater modernization program has been progressing with the installation of new equipment. Twenty more provincial cinemas have installed the Philips 70mm Projection equipment and six others have been equipped with the Philips FP20S, pulse lamp projection. Installations of xenon lamps for projection have also been going ahead in cinemas as well as in studio and laboratory preview theaters. Projectomatic, the system of automatic projection, developed by the G.B.-Kalee Division of Rank Precision Industries Ltd., has now been installed in some 235 theaters. The model "O" designed to meet the Home Office Regulations 1958 No. 1530, performs the following operations automatically: it strikes the arc, and starts the projection motor; accomplishes changeover of both picture and sound (optical and magnetic); and switches off the outgoing arc and projection motor. It also operates an alarm system which gives audible warning at selected points if any abnormal technical conditions should arise in the projection room.

Many of the cinemas have installed xenon lamps with Projectomatic, thus freeing their operators from the chore of renewing carbons and giving greater efficiency.

Great Britain — Television

Part I — British Broadcasting Corp.

Considerable interest was aroused by the publication in May, 1960, of the "Report of the Television Advisory Committee 1960." The committee was formed to advise the Postmaster-General on the development of television and sound broadcasting in the United Kingdom at frequencies above 30 mc/sec, competitive television services, and television for public showing in cinemas and elsewhere. At the request of the committee, studies were made by BBC including (a) propagation tests in Bands IV and V, (b) large-scale field trials to assess the potentialities of Bands IV and V for television broadcasting, (c) tests on a color system of the type used in the United States (the N.T.S.C. system) but adapted to the British 405-line standards. The summary of conclusions and recommendations from the report follow:

"Bearing in mind that our examination has been largely confined to the technical aspects of the questions which have been put to us and that we cannot anticipate the answers to the political and economic questions which will need to be taken into account, our conclusions and recommendations are that:

(a) The existing 405-line standards will not be adequate for all purposes for the next 25 years;

(b) 625-line transmission making full use of a channel 8 mc/sec wide offers worthwhile improvements in quality over the present British 405-line transmission in a 5-mc channel and has other advantages;

(c) If television is to be confined to the existing VHF Bands I and III, then a changeover to higher standards within those bands is impracticable even for the existing two programmes. Television would therefore have to adhere to the present 405-line standards. With these standards the two Bands could accommodate a third programme of near-national coverage; alternatively, the remaining channels in Band III could be used to strengthen existing services.

(d) Bands IV and V must, therefore, be brought into use if television policy favors: (i) a change on merits from 405-line to 625-line standards even if no additional programme is to be provided; (ii) more than three programmes whatever the line standards used.

(e) Extension of television into Bands IV and V would offer the last opportunity for making a change in line standards; and if television policy requires the use of Bands IV and V we recommend the use of 625-line standards with an 8-mc channel in these Bands and ultimately their introduction into Bands I and III;

(f) A fully compatible colour system is required;

(g) Colour should, however, only be introduced using the line standards to be ultimately adopted for monochrome transmission and therefore any decision with regard to the introduction of colour must follow a decision on line standards."

A Committee on Broadcasting 1960 has been set up by the Postmaster-General to

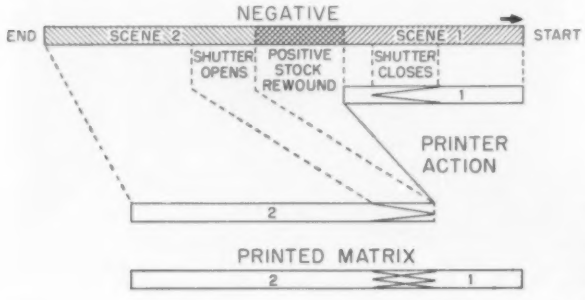

Fig. 80. Auto-optical printing for a dissolve effect, Technicolor.

consider the future of the broadcasting services in the United Kingdom and to advise on the services which should in future be provided by the BBC and the I.T.A., and other matters. The charters of the BBC and I.T.A. expire in 1964, when the future organization of sound and television broadcasting in the United Kingdom will be the subject of a Government decision.

The BBC's network of transmitters already serves 98.8% of the United Kingdom population and further major increases are therefore not possible. However, a large number of unattended low-power stations are being planned and will be brought into operation progressively during the next few years. The purpose of these is to extend the BBC's Television Service to the scattered areas not yet served and to improve reception where this is difficult within areas already covered.

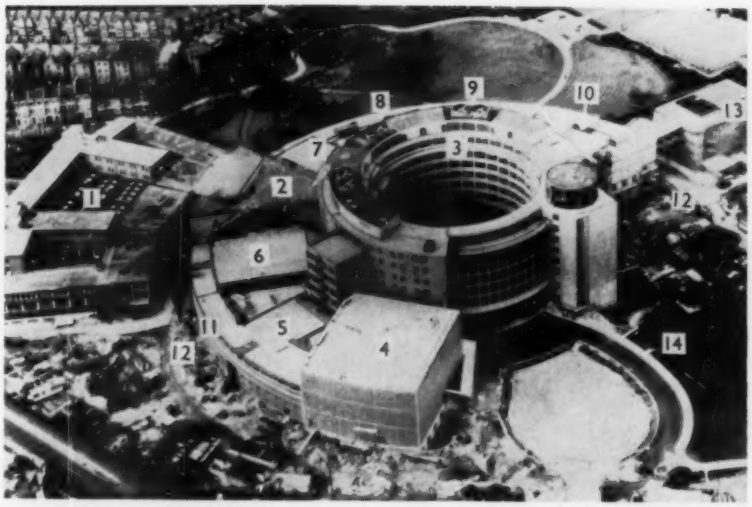

Fig. 81. BBC London Television Centre from the air, as it was in April 1960: (1) The Scenery Block; (2) The Central Wedge; (3) The circular Main Block; (4) Studio No. 1; (5) Studio No. 2; (6) Studio No. 3; (7) Studio No. 4; (8) Studio No. 5; (9) Studio No. 6; (10) Studio No. 7; (11) The Peripheral Runway; (12) The Ring Road; (13) The Restaurant Block; (14) the site for the future extension.

BBC Television Centre, London: A major development in the BBC's Television Service in 1960 has been the completion of the main building of the new Television Centre in West London, now in operational use (Fig. 81). The Centre is designed to meet the special requirements of television and its studios are the first to be designed and built expressly for the purpose of BBC television programs.

The conception of the Television Centre is a practical one. A 3½-acre Main Block, in the form of a ring, 500 ft in diameter, houses the studios, the technical areas and all the equipment directly associated with television production and the transmission of films and telerecordings. In this block there are also facilities for artists, including dressing rooms, make-up and wardrobe, and the administrative offices. The studios radiate from the inner ring of this circular building, an arrangement which well meets the technical requirements and provides easy access from the inner ring for staff and artists. Around the outside of the studios (the studio floors are at ground level) runs a covered runway for the transport of scenery to and from the outer ends of the studios; the scenery is built and stored in a separate Scenery Block which was completed in 1953 and is adjacent to the Scenery runway. An additional block, to be started in 1961, will centralize technical maintenance and provide stores and offices and a suite for experimental transmissions.

An innovation in the arrangement of the equipment for technical control of the television pictures is that the lighting control and camera control equipments are placed side by side, with the result that the staff operating them are able to use the same picture monitors for assessing technical picture quality (Fig. 82). This enables a uniform standard of picture quality to be maintained.

The first of the studios at the Television Centre was brought into use on 29th June 1960,[112] and a second similar studio was to be ready for use in January, 1961. These two studios each have a floor area of 8000 sq ft; they are equipped with 4½-in. image-orthicon camera channels, normally four to each studio, but provision is made for six channels for complex productions.

The vision-mixing equipment is situated physically in the Apparatus Room and is controlled remotely from the production control desk. It consists basically of two 8-channel fader units and a 2-channel (group) fader unit, with

Fig. 82. Lighting and vision control room, BBC Television Centre, London.

Fig. 83. Image orthicon zoom camera, BBC and Rank Precision Industries, Ltd.

Fig. 84. Cable film equipment.

clamp amplifiers, preview switching and cut facilities. The group controls can be used to select the output from either bank of channel faders or a mixture of the output from both banks. An important advantage of this arrangement is that it enables special effects or other combinations of picture sources to be set up on one group panel while the other is on transmission. A preview is thus provided of the resulting combinations.

Inlay/Caption equipment is provided, consisting of two vidicon camera channels, slide projectors, a film strip projector, and an electronic switch. A new departure is the use of a vidicon camera channel in place of the flying-spot technique which has been in use since 1953 for generation of the switching signal for inlay purposes. Both inlay and captions can be controlled by a single operator at a desk in the production control room.

The high stability of the Marconi Mark IV cameras, designed to meet the BBC's specifications, has made it possible for one operator in the Vision/Lighting Control Room to have electrical control of all the cameras in a studio, using only two operational controls for each camera, one for remote iris control, the other to control "picture black." The remaining camera controls are preset.

The production lighting installation at the Television Centre follows, in the main, the general principles pioneered in the Riverside Studios. Electric hoists are used for the raising and lowering of lamps and a comprehensive dimmer system gives intensity control and switching of every connected studio light source from a centralized control desk. The principal innovation is the introduction of luminaires which can be panned, tilted and focused by means of a pole from a studio floor.

Cameras: In collaboration with the Taylor, Taylor & Hobson Division of Rank Precision Industries, Ltd., the BBC has produced a new prototype television camera (Fig. 83). The normal turret-mounted lens system is replaced by a zoom lens lying alongside the electronic components of the camera and covering all the normal range of camera viewing angles and apertures. The new camera is so constructed that the entire lens assembly is mounted within the camera body, thus providing a more compact camera with better protection against accidental damage to the lenses. A feature of the Varotal III zoom lens made by Taylor, Taylor & Hobson, which makes it especially suitable for this application, is the long back focus distance of about eleven inches. This makes it possible to fold the optical path at the rear of the camera so that the camera tube yoke can lie alongside the lens assembly. The compact layout considerably reduces the overall length of the camera as compared with the conventional "in line" arrangement. The folding of the optical path also offers the opportunity to introduce two filter wheels, one with neutral density filters and one with color filters.

Cablefilm: The Cablefilm equipment (Fig. 84) by which short sequences of 16mm film may be transmitted over long audio circuits by exchanging bandwidth for time, initially installed in Montreal, has now been bought by the National Broadcasting Co. of America and transferred to New York. The frequency delay characteristic of the transatlantic cable music circuit between Montreal and London is quite different from that of the circuit between London and New York. New basic delay equalizers were therefore constructed and, to achieve the desired performance, were supplemented by a specially-designed echo waveform corrector.

Aerial Design Computer: The increasing demand for transmitting aerials with oddly shaped radiation patterns has prompted the BBC to build a computer. This will assist in the early stages of design, when it is difficult to decide how many radiating elements are needed in each tier of the array to fulfil the requirements. The computer may be roughly described as a radiation-pattern adding machine. First the radiation pattern of a single element, mounted at a reasonable distance from the mast, is set up on the computer. Then trials are made by computing the resultant pattern of several identical elements (up to six in number) arranged at various positions round the mast, not necessarily symmetrically.

Part II — Independent Television Authority

During 1960, one new Independent Television station was opened, bringing the total of working stations to eleven. The new station is situated in the Dover, Kent, area serving a population of almost one million people. The construction of additional stations at Caradon Hill, Cornwall; Stockland Hill, Devon; Caldbeck, Cumberland; Durris, near Aberdeen; and Mounteagle, near Inverness, is underway.

When, in 1956, network operations started in Independent Television, there were transmitting stations operating in London and Birmingham, and the total length of vision circuit was 260 channel miles. By the end of 1960 the Authority had appointed 12 program contractors and had completed 11 transmitting stations. The total distance covered by vision links had increased to 2725 channel miles.

The emergence of four major program producing companies and a number of smaller companies in different areas has resulted in a complicated pattern of network operation. It is likely that stations in widely different areas will need to be fed with different programs rather than a single network feed. To coordinate this

large number of simultaneous network requirements, the Authority has set up a Lines Booking Unit at its London headquarters. The function of this unit is to control and schedule the use of each vision channel at all times during the broadcasting day.

Associated Television Ltd., at the end of 1960, had completed the first part of a development program with the opening of two studios. Both studios are equipped with five Pye 4½-in. Mark IV camera channels, a 34-channel sound mixing desk, and full facilities for working on 405, 525 and 625 lines.

A Presentation Continuity Studio (Studio 4), brought into use by Tyne Tees Television Ltd., employs a remotely controlled vidicon camera. A vidicon slide scanner has been constructed which can be remotely controlled. A two-camera outside broadcast unit was constructed during the year to extend the number of mobile cameras available from three to five. The sound facilities of the Station have been extended by the introduction of (a) an Electrovoice Directional Boom Microphone, the first of its kind to be used in Britain (this is used extensively on musical productions), (b) an E.M.I. Artificial Reverberation Machine, and (c) an E.M.I. TR90 Tape Recorder to supplement the existing Ferrograph machines.

Scottish Television Ltd. transplanted its technical operations to a Central Telecine Area which was designed and installed by their Engineering Department. The Central Facilities Room (Fig. 85) contains a total of four vidicon telecine channels and one flying-spot channel together with two Ampex Videotape Recorders. For program continuity switching, a switcher for sound and vision was developed and built to enable one operator to discharge these duties. Automatic previewing and superimposition facilities are included. Eighteen transmission and standby sources are indicated by Nodistron panels.

Southern Television Ltd. opened new premises in Dover, April 19, 1960, to operate in conjunction with the I.T.A. Church Hougham transmitter. As an initial stage a 1000-sq ft studio was built. Present equipment includes two Marconi broadcast vidicon camera channels together with an associated vision mixing unit and E.M.I. sound equipment. The studio is used at the present time to insert items of interest to the Southeast Region into the existing program structure of Southern Television.

Hong Kong

Hong Kong is enjoying a period of prosperity with the rapid increase in population, and the film industry, on the whole, is benefited accordingly. The 1959 total of 50 first run and second run theaters in and near Hong Kong and Kowloon (excluding neighborhood suburban houses) was increased by two theaters which were completed and opened for public patronage in 1960. Sites have been broken and construction is now underway for six more motion-picture theaters.

Two new studios were also completed in 1960, making a total of eight studios in use. The best equipped of these are Yung Hwa Studio (the only studio in Hong Kong equipped with a Mitchell background projector; and the studio is now installing closed-circuit television), and Shaw Studio which has its own processing laboratories. In these eight studios, about 240 feature films have been made, of which seven are in Eastman color, to meet the various demands of the 12 million overseas Chinese located throughout Asia.

Approximately 1900 people are directly employed by the film industry and many more are indirectly dependent on it. It is quite amazing that such a tiny spot as Hong Kong should rank as one of the most productive centers of the film industry in the world. Whether Hong Kong will be able to maintain its status depends largely on the political and economic developments of those countries where the overseas Chinese have settled.

The following statistics of the Hong Kong motion-picture film industry for 1960 may be of interest:

Number of films produced	240
Production cost	HK $25,000,000
Raw stock used	30,000,000 ft
Number of people employed	1895

India

Progress made by the Indian film industry during 1960 has mainly been in the increase in total output of feature films to an all-time record of 320, compared with 303 in 1959 and 293 in 1958. These have been divided among various languages as follows:

	1960	*1959*
Hindi	120	116
Gujarati	2	0
Marathi	15	9
Bengali	36	38
Oriya	5	2
Punjabi	4	1
English	1	1
Sindhi	1	0
Tamil	64	76
Telugu	54	47
Kannada	12	5
Malayalam	6	3

The increase was mainly in the Madras area, while in Calcutta there was a decrease of two. A noteworthy fact is the marked increase of regional-language pictures, which require a very small number of copies for their exploitation.

Fig. 85. Central Facilities Room, Scottish Television, Ltd.

Fig. 86. 16mm projector manufactured by Kine Engineers, Bombay, India.

This has been due primarily to a Government levy on all release footage which penalizes the larger productions.

Finance and censorship continued to be the headaches of the industry. A large number of pictures are still under production in various stages, and all available finance is divided among these. Many of the producers are stranded without buyers and adequate finance. It may take years before all the pictures are completed. And yet, all indications point to a still larger number of pictures being completed in 1961 than at any time in the past. The industry is handicapped by the acute shortage of theaters in the country, especially in the larger cities — there are only 4300 theaters (including mobile) to cater to a population of 400 million!

As far as censorship is concerned, the puritanical attitude has, if anything, been further stiffened. To strengthen the hands of the official censors, a group of non-officials representing an older generation, have been carrying on a vigorous campaign, both among the public and the Government, for still more rigid censorship, "in order to save" in their words, "the morals of the whole nation."

Documentary film production has been stepped up, the number of releases in 1960 being much higher than in the previous years. As before, the bulk of documentary film production is in Government hands, while all release is completely nationalized.

In the field of technical progress, the Government has entered into an arrangement with the Etablissements Bauchet, a French firm, for setting up a factory for the manufacture of photographic paper and raw film together with the required base. The factory is under construction and is expected to go into production within the next two to three years.

The manufacture of 16mm projectors (Fig. 86) has been given much more attention than its 35mm counterpart, inasmuch as at least three independent firms have exhibited their products and are now in full production.

Manufacture of printing machines has been announced by a local firm, in addition to other film processing equipment. A prototype, recently exhibited, is of the continuous type with a choice of three separate types of light changes, namely, the semiautomatic somewhat like that in the older models of the Bell & Howell; the punched light band; and the electrically operated light shutter. There is also provision for the insertion of subtractive color filters. The same firm has also placed a high-speed, high-temperature processing machine on the market.

In the field of television, the experimental transmitter at Delhi has not been as popular as was expected. This is not surprising because the price of television receivers in this country is much too high even for the upper middle class, and especially when transmissions are restricted to four to six hours a week. However, plans to establish another transmitter at Bombay have been discussed.

The announcement by the Government last year of plans to establish an Institute for the training of film technicians was generally welcomed, except by those who fear that training of such technicians will augment the already large number of qualified men who are now unemployed. The Institute has now come into being, and is expected to begin classes by June 1961.

All told there has not been any spectacular progress in the Indian Film Industry during 1960 except in the increased output. There appears to be a close race between an admitted rise in the boxoffice returns and the cost of production coupled with increasing taxation. If further taxation is not imposed, some stabilization of the industry's economy can be expected.

Ed. Note: See also "Advanced Studio Sound Facilities in India" by P. A. Peston Jamas, pp. 413–416 of this issue of the *Journal*. This was received too late to be incorporated in the text portion of this issue.

Iran

One more studio has been added to the number of studios in Tehran. It is called Demavand. The studio has dubbing facilities and is favored by local theaers, as they can put magnetic track on the film, without damaging the original soundtrack. This enables the movie importers to show the film in both Farsi and original soundtrack, if necessary. However, it should be noted that most of the films shown in Iran are dubbed into the Persian language.

The prominent local productions last year were: *Quiet Before the Storm, Spring of Life, The Stars are Shining* and *The Scourge of Life*. None, however, was successful financially or could compete with the American or European films. As the dubbing improves locally, more American and British films are shown, rather than the Indian or Arabic films, which were very popular during 1959.

Vitab and Italian Ferrania have imported a complete Ferrania color laboratory for 16mm and 8mm movie films. Studio Pars Film completed its 35mm color laboratory during last year and can now make 35mm color film locally. Villa Film is a new dubbing company, which was founded in 1960. The company, in addition to dubbing films, imports and sells Russian-made projectors and other motion-picture equip ment.

Italy

Several motion picture projectors have been marketed by Ing. Angiolo Fedi s.p.a., Milan. These include a small 35mm projector (Fig. 87) equipped with either a carbon arc or a xenon lamp, and a universal 35/70mm projector (Fig. 88) with a heavy duty arc lamp.

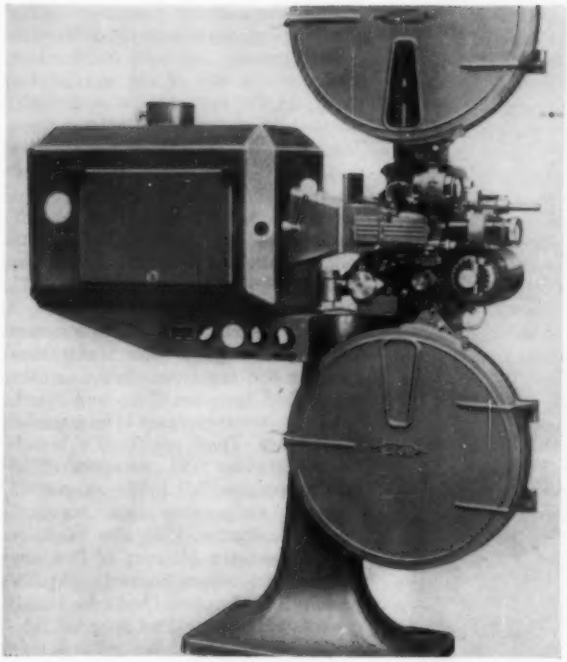

Fig. 87. Projector, 35mm, Ing. Angiolo Fedi.

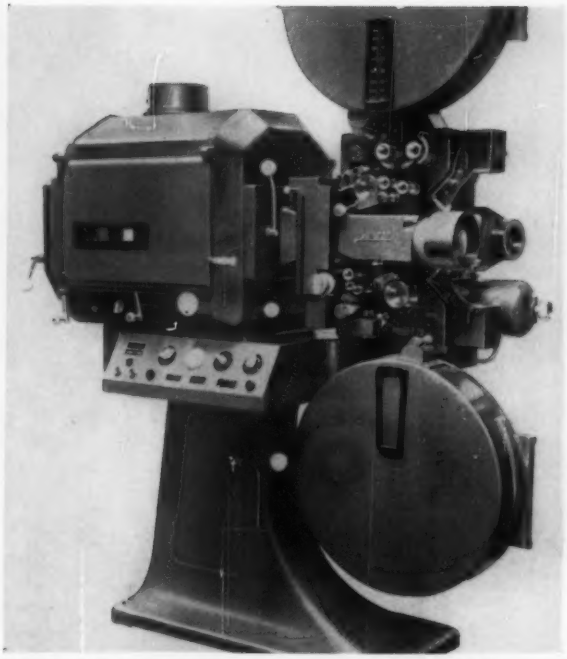

Fig. 88. Universal 35/70mm projector, Ing. Angiolo Fedi.

Equipment for converting existing 35mm projectors to 70mm was also made available.

In the SPES-Catalucci Processing Laboratory of Rome, two types of wet printers have been recently installed, a 35mm contact printer and an optical printer for reduction from 35mm to 16mm.

The assembly of the contact wet printer represents a technical improvement applied to a continuous printer with additive light system for color film printing (Fig. 89). Both negative and positive film go into a small container filled with tetrachloroethylene. Immediately after, a squeegee presses both films and the superfluous liquid returns to the container, allowing only a thin layer to remain in between negative and positive film. Then the image is printed. The two films enter a small drying cabinet, where warm air quickly jet dries the remainder of the liquid. As the negative film is rewound, the positive goes on to the sound-track printing aperture; the sound is thus normally printed.

The printer speed is 1000 ft/hr. During the printing operation the liquid is continuously filtered to eliminate any impurities left by the films. This filtration takes place by means of forced circulation by a pump which takes the liquid from the container and forces it through a filtering column back to the container. This printer is especially recommended for printing master positives or small amounts of release prints from old and scratched negatives, or else to regenerate negatives, dupe negatives or masters seriously damaged.

The optical reduction wet printer is an intermittent printer, with perforated diaphragms for light change points (Fig. 90). The 35mm film enters the liquid container, and as it comes off is squeegeed so that only a thin layer is left. Immediately after it passes on to the printer aperture where the image is projected and optically reduced on the 16mm film, which runs at the other head of the printer. The 35mm film is dried in a small cabinet by the lantern cooling air and is rewound.

Since in projection printing even the smallest defect existing on the negative is magnified, the use of this printer is not confined to the cases where the 35mm negative is heavily damaged.

Technicolor Italiana commenced operation as a film laboratory for developing and printing color films in mid-1958. This laboratory is now equipped with the most recent innovations based on several decades of operation of the affiliated Technicolor plants in London and Hollywood. It is performing all industrial cinematographic operations in its several departments, culminating in release prints in the Technicolor Dye Transfer process. Of particular interest is the Camera Department, which is equipped with Technirama cameras (both standard and lightweight), and the Special Effects Department which is doing interesting work including travelling mattes. Within a short time the activities of the laboratory will include printing 16mm release prints.

Tecnostampa Laboratories in Rome has improved production during 1960 by increasing use of the most up-to-date equipment. A spray developing machine for black-and-white positive (Fig. 91) has now begun producing. This machine produces at a rate of 200 ft/min and is completely automatic; only one operator is required for threading, unloading, and the controls. The machine is provided

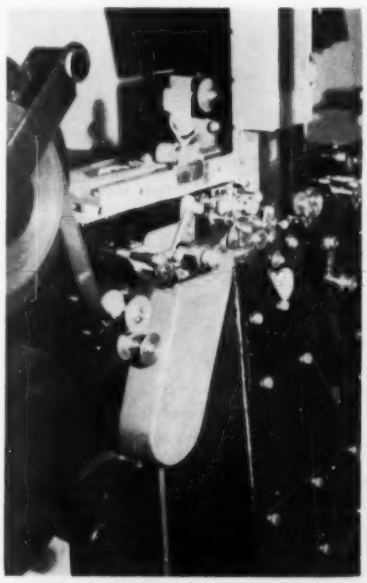

Fig. 89. Contact continuous wet printer, 35mm, SOES-Catalucci Processing Laboratory, Rome.

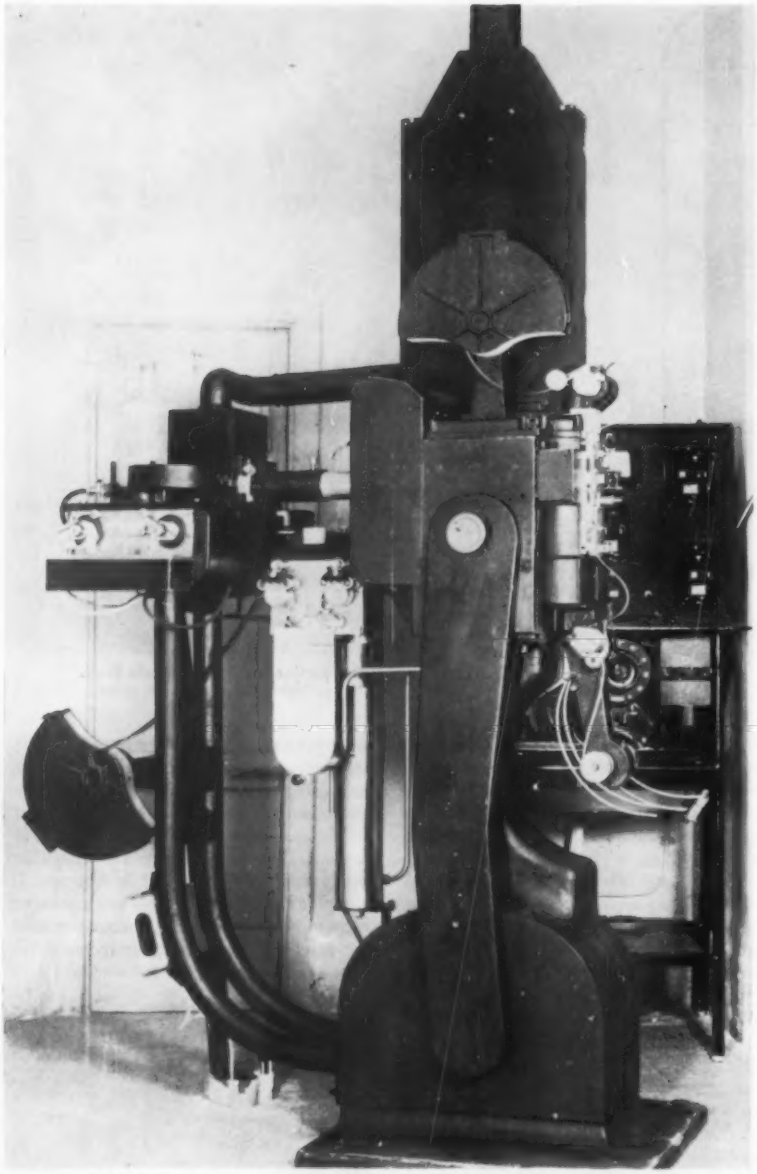

Fig. 90. Optical reduction wet printer (35mm to 16mm), SPES-Catalucci Processing Laboratory, Rome.

with means for connecting with a projection control system.

The Centro Sperimentale di Cinematografia of Rome, Government School for the Formation of Youth in Cinematography, both in the artistic and technical field, celebrated in November, the 25th Anniversary of its foundation. A complete TV Studio, with professional equipment, has been organized. A studio has been transformed and adapted to TV needs. In a new building near the studio, automatic electric controls have been installed, as well as auxiliary services. The studio is equipped with four Pye TV cameras, three orthicon-image and one staticon. In the video direction room are located the video camera controls, the monitors, the video mixer and the special effects generator. The lighting circuit is controlled by servo-mechanisms. The laboratory of the Centro is setting up a general control panel. Monitors for six cameras are planned for, as well as telecinema, telerecording, transmission preview, and transmission control installments. The students will be able to follow the practices from suitable halls, which are adequately equipped.

Japan

The wideband microwave network in Japan for TV and telephone transmission continued to expand rapidly during 1960 because of greatly increased demand for telephone traffic and TV programs in large cities throughout the country. Microwave circuits in service at the end of the year totaled about 25,600 system-miles and 5,400 system-miles were under construction. Telephone circuits on these microwave routes were scheduled to reach a total of 1,270,000 channel-miles and the microwave circuits in service for TV transmission will total 13,000 system-miles at the end of 1960 fiscal year (March 1961). These show a 25% increase over the previous year.

The 2000-mc over-the-horizon system for telephone use is now under construction between Japan proper and the near island (between Oura and Nase), and the system is expected to be extended to Okinawa. There are 109 TV broadcasting stations (51 non-commercial and 58 commercial) in Japan and 23 additional stations are under construction. In September, 1960, after extensive deliberations, the Ministry of Post and Telecommunications licensed eight TV stations in Tokyo and Osaka for NTSC color broadcasting. The Nippon Telegraph and Telephone Public Corp. is in the process of modifying the microwave network to meet these demands for color TV transmission.

Ed. Note: See also "Motion-Picture Equipment recently Developed in Japan" by Kiyohiko Shimasaki, pp. 412–413 of this issue of the *Journal*. This was received too late to be incorporated here.

New Zealand

This is the first Progress Report on New Zealand, a relatively small country with a population of some two and a half million which supports 668 commercial theaters, of which 575 are equipped for 35mm and 93 for 16mm.

No feature films are, at present, being produced in New Zealand, but increasing use is being made of New Zealand locations by overseas producers. These use local talent, technicians and equipment supplied by the Government-operated National Film Unit, which has the largest studios and laboratory in the country. Up to 100 reels of 16mm and 35mm black-and-white and color films are produced annually by the Unit which, with a staff of 70, also does the processing (Fig. 92) and sound recording (Fig. 93). Newsreel, tourist, travelogue, departmental and documentary-type films are the main ones produced. These have met with notable success in overseas film festivals, 55 awards having been won over the past 10 years. Film requirements for television have increased production and further new processing equipment is being installed. Color processing is contemplated and it is hoped to have Government approval for the purchase of the necessary equipment in the near future.

Television was introduced during 1959 in Auckland by the Government and operated by the New Zealand Broadcasting Service. Three more stations are to be established which will give a service to the four main geographic centers. The European CCIR 50-field 625-line system has been adopted and, at the moment, Marconi transmitters and cameras are being used. Two video-tape machines have been ordered and transmitting hours daily are being increased as equipment and program material become available. Television sets are manufactured in New Zealand in limited quantity dependent on the import license quota for television tubes. One local manufacturer produces 16mm sound projectors.

Puerto Rico

The production of feature motion pictures by local producers was down compared with last year. Activity in the general field of motion pictures continued high, however, in newsreel, documentary and television film dubbing into Spanish. A new Super Drive-in Theater is scheduled for the San Juan metropolitan area during 1961. This will bring the total of such "under the tropical stars" facilities to three in the San Juan area.

Film & Dubbing Productions Inc. (formerly the Dubbing department of WKAQ-TV Telemundo) continued to improve its installation with the purchase of an 8-way mixing console embodying many novel features and the most modern of design techniques. They completed dubbing into Spanish 597 half-hour units of filmed program material in the course of the twelve months period.

During 1960 video-tape recording came to Puerto Rico. Currently a single unit is in full-time operation at WKAQ-TV and plans for the future include addition of a second unit, possibly mobile. In the meantime, locally produced programs, recorded on tape, are finding their way onto the airwaves on the mainland. Television coverage of the island during 1960 was improved and new stations went on the air. Further expansion and additional channels are expected during the year.

Construction continued on what will eventually be one of the largest centers of its kind by El Mundo, the leading local Spanish language newspaper. The project will house not only the newspaper offices, presses, etc., but will also have studios for WKAQ Radio El Mundo (AM and FM) plus fully equipped television studios and film production and dubbing facilities. Because of the magnitude of this project, the cost of which runs into several million dollars, no part of it will be completed in 1961. Automation in TV broadcasting is finding its way into Puerto Rico and today many of the previously manual operations are handled by automatic electronic devices. No station has yet, however, switched over to completely automatic operation.

Importation of television receivers into Puerto Rico during 1960 approximated 25,000. The estimated total number of sets in operation in Puerto Rico at the end of 1960 is 215,000.

Sweden

During 1960 activity in film and TV has been characterized by the competition between these two media of entertainment. The film business, with a substantial decrease of attendance in the theaters of more than 40%, is reorganizing. Television, on the other hand, with a constant increase of license-payers, the number now amounting to more than 1 million, is equipping considerably faster than was orginally foreseen. In fact, the Swedish TV industry is five or six years ahead of plans. In a country of a little more than 6 million people, 1 million license-payers, paying Sw.Cr. 100 each, is a considerable number. This is in spite of the program time being not more than about

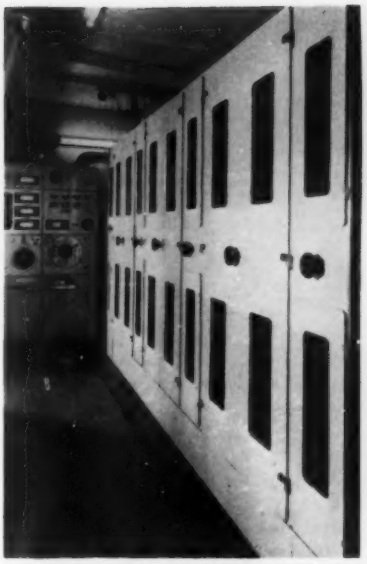

Fig. 91. Spray developing machine, Tecnostampa Laboratories, Rome.

20 hours a week. The program quality, considering the size of the country, is fairly good and the technical quality excellent. There are now 46 TV stations opened and 3100 km of link-connections between them.

In the film business smaller theaters are closing down and the bigger re-equipping for still larger screens and more luxurious interiors. There are now ten Todd-AO-equipped theaters in use, two of which are portable. The portable theaters, which can be taken down and erected in three days, are used by a big theater chain, Folkbiograferna. There are now four Cinerama and Cinemiracle sets of equipment in use, one in Stockholm, two in Gothenburg and one in Malmö, and this medium has been a great success in Sweden.

On the studio side, the two motion-picture companies Svensk Filmindustri and Sandrew-ateljéerna have combined their efforts. Sandrew-ateljéerna has been

Fig. 92. Processing machines at New Zealand National Film Unit.

Fig. 93. Sound recording at New Zealand National Film Unit.

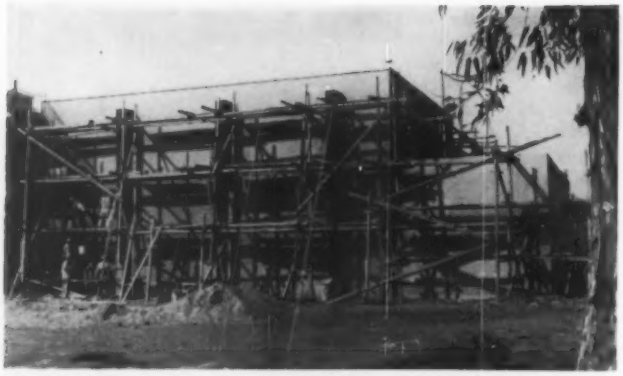

Fig. 94. Exterior view of processing laboratory under construction in Cairo, Egypt.

Fig. 95. Interior view showing processing machine in laboratory under construction in Cairo, Egypt.

closed down and the complete equipment moved to Svensk Filmindustri, where two new excellent stages will be ready for use in April, 1961. The size of the new stages is approximately 600 sq ft each and the total number of stages at the Svensk Filmindustri is now six, the biggest being more than 11,000 sq ft with a free height of 23 ft.

United Arab Republic

There is nothing to report in the field of motion-picture developments in the United Arab Republic for 1960 except that the new buildings of the Misr Studios and the new processing laboratory are under construction in Cairo and it is expected they will be in operation by July, 1961 (Figs. 94 and 95). The processing laboratory will be capable of doing high-quality work for both 35mm and 16mm black-and-white and color films.

The new television stations for the United Arab Republic are in operation in Cairo and Damascas. Other stations will be in operation in the near future to cover the entire area of the U.A.R. The number of televiewers is now about 50,000 and will increase in the future.

U.S.S.R.

On January 1, 1961, the U.S.S.R. had a total of 101,000 motion-picture theaters and other places equipped with motion-picture projectors — 11,000 more than in 1959. The production of release prints in motion-picture laboratories was increased. In 1960 the total footage of release prints prepared amounted to 1,860 million ft, including 500 million ft of color film. The construction and remodeling of motion-picture studios, film printing laboratories and enterprises manufacturing motion-picture apparatus and photographic film continued. New kinds of equipment and apparatus for various applications were designed and built.

Wide-Screen Motion Pictures[113–115]

In 1960 the Mosfil'm Motion Picture Studio completed the production of a wide-screen color film called *Story of the Passionate Years*, which was photographed on 70mm film. Figures 96 and 97 show the 70-SK synchronous camera and a slow-motion camera, used by the studio for this film. The 70-SK camera equipped with a synchronous electric motor permits exposures at a speed of 24 frames/sec, while the d-c motor permits changing from 8 to 30 frames/sec. The slow-motion camera can be used for exposures with speeds up to 100 frames/sec.

A special PPU-70 projector (Fig. 98) was designed for projecting frames of 70mm film singly or in succession. The registering of frames by pilot pins allows high accuracy of positioning the image on the screen.

For recording and re-recording the multichannel stereophonic soundtracks,

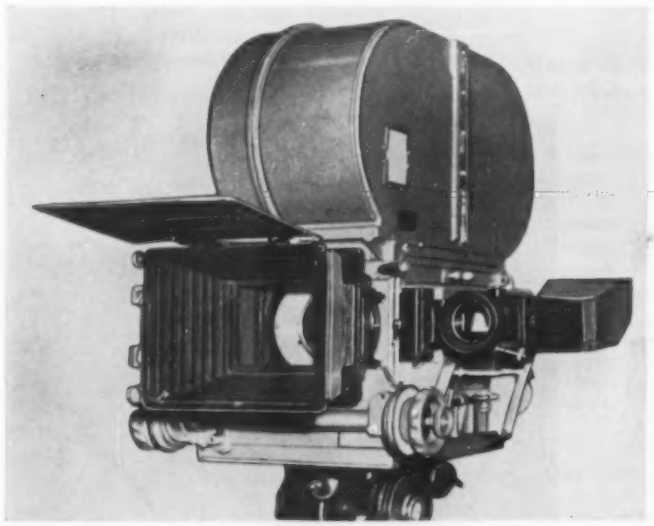

Fig. 96. Synchronous 70-SK Motion Picture Camera for 70mm film.

Fig. 97. Slow-motion camera for 70mm film.

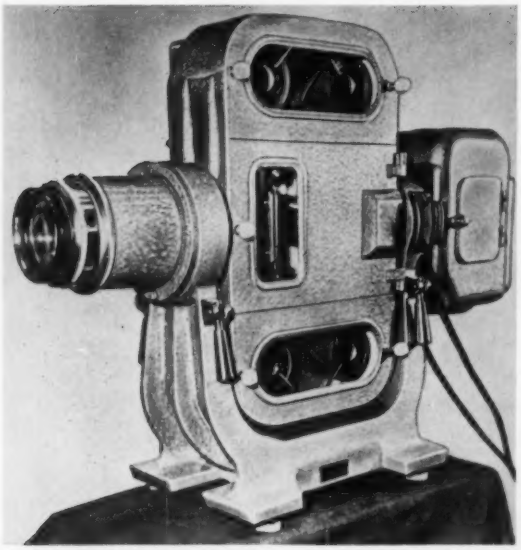

Fig. 98. Single-frame projection arrangement for obtaining combined frames on a 70mm film.

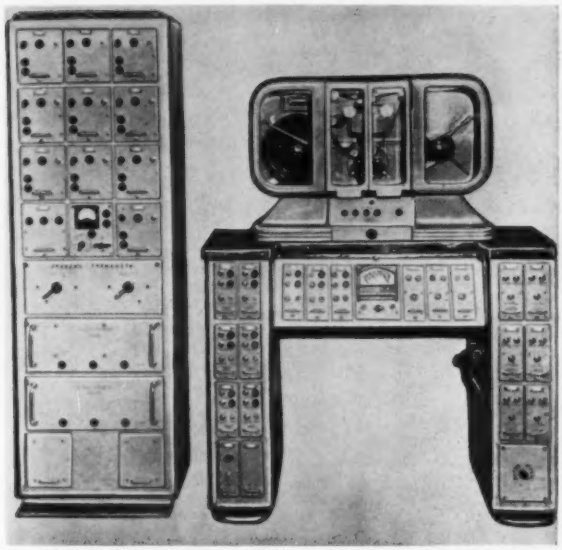

Fig. 99. KZM-10 apparatus for synchronous 10-channel stereophonic recording of sound.

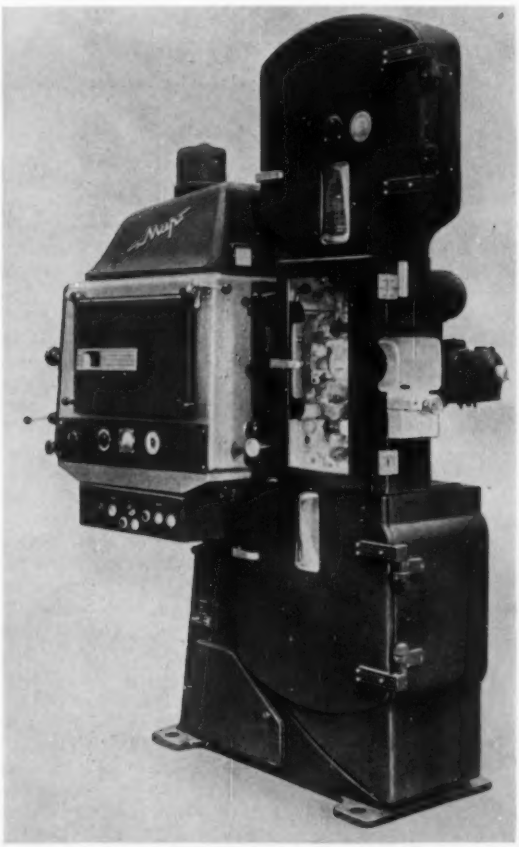

Fig. 100. Universal TKPU-1 motion-picture projector with a 20,000-lm light flux for 70mm and 35mm films with ordinary and anamorphic images.

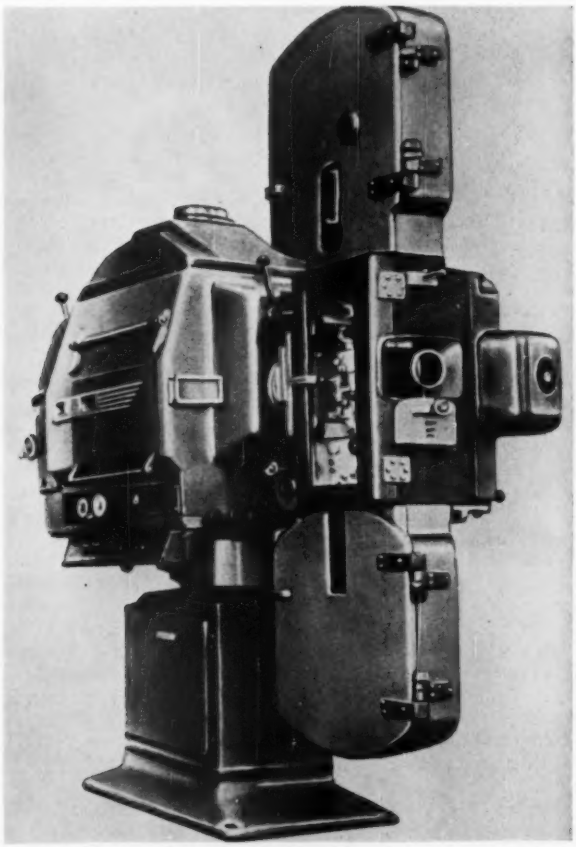

Fig. 101. Universal motion-picture projector with 40,000-lm light flux for 70mm and 35mm wide-screen and ordinary films.

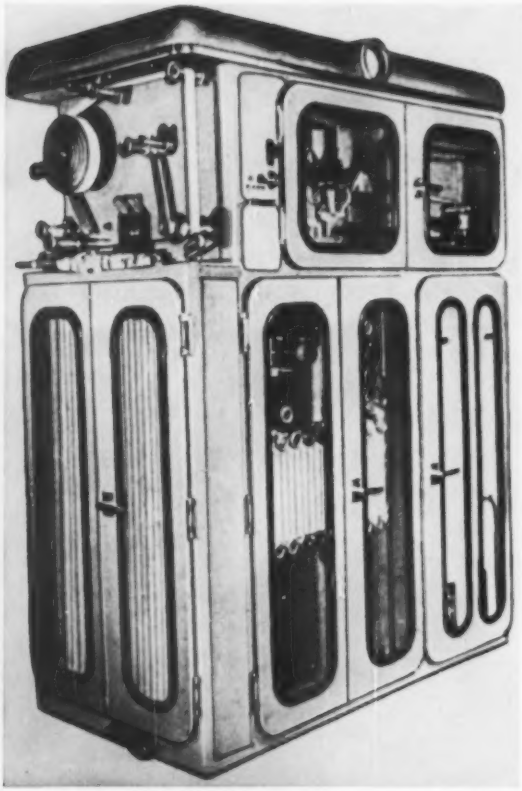

Fig. 102. MP-5 machine for coating magnetic tracks on 70mm and 35mm wide-screen release print.

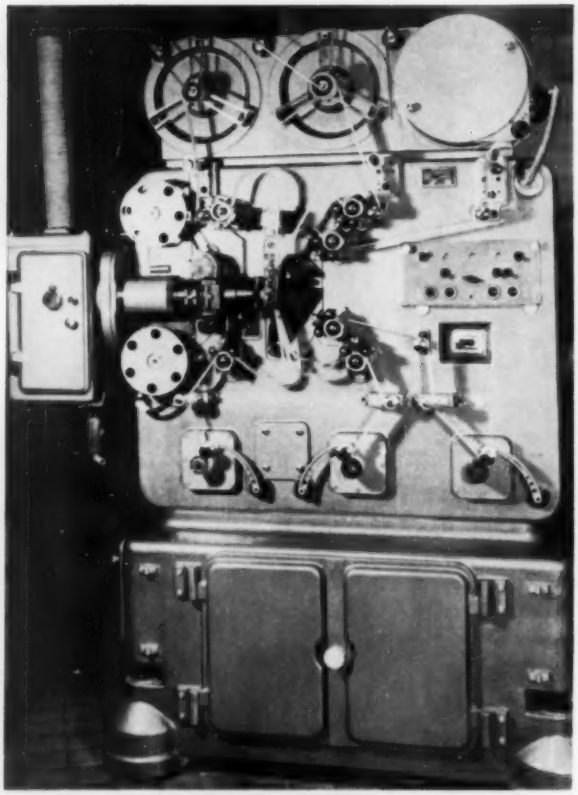

Fig. 103. 23 PTK-1 motion-picture printer for accurate printing of Cinerama films.

the KZM-10 apparatus (Fig. 99) was designed for synchronous 9-channel recording of sound on 35mm magnetic tape. By using the special "panoramic" monitor, the sound operator can use ordinary soundtracks together with the stereophonic sound tracks during re-recording. These instruments can run at speeds of 19, 22, or 28 in./sec and, therefore, they can be used for scoring, re-recording and printing of soundtracks for Circarama (circular) wide-screen and Cinerama motion pictures.

In 1960 TKPU-I universal motion-picture projectors (Fig. 100) were installed in the Mir motion-picture theater in Moscow.[115] These projectors can be used for projecting both 70mm films and other films with squeezed (anamorphic) and ordinary images on 35mm film. During the projection of a 70mm film, the width of the screen in this theater is 75 ft, while the luminous flux of the projector exceeds 20,000 lm. The carbon arc projector uses water cooling and has a cold light reflector 18 in. in diameter. A curved film gate is used. The designing of another universal projector for 70/35mm films (Fig. 101), with a more powerful arc lamp, was completed by the end of 1960. The effective luminous flux of this projector amounts to approximately 40,000 lm when a 70mm film is run. The arc lamp with air cooling has been calculated for a current of 180 to 190 amp instead of 120 and the cold light reflector is 24 in. in diameter.

During projection of 70mm films, both types of projectors reproduce a stereophonic 6-channel magnetic soundtrack. Provision has also been made for reproducing sound from a 9- or 6-channel soundtrack recorded on a separate 35mm magnetic tape. It is planned to install projectors with higher luminous fluxes in a number of large motion-picture theaters and auditoriums with a seating capacity of 2500 to 6000 in a number of cities of the Soviet Union.

An MP-5 machine has been designed (Fig. 102), with a production capacity of 5900 ft/hr, for coating magnetic tracks on 70mm and 35mm release prints. The coated film is dried by infrared radiation and forced air circulation.

Cinerama and Circarama

In 1960 the Estonian motion-picture studio (City of Tallinn) finished the production of the first artistic Cinerama film, *Mischievous Curves*, by using three 35mm films with 28-in./sec speed for camera and projection. A 9-channel stereophonic sound-track recorded on a separate 35mm magnetic tape was used for this system. The film was exposed with a synchronous PSO camera with interchangeable lenses having focal lengths from 27mm to 100mm. This first production of a Cinerama full-length feature film was successful. It opens new possibilities for Cinerama which had been used before only for newsreels and travelogues.

The Central Studio of Documentary Films in 1960 released two new Cinerama programs. One of these, called *Frenchman in Moscow*, was introduced for showing in the Fall of 1960 in a Paris motion-picture theater equipped with Soviet apparatus. The latest Soviet Cinerama films have been on DS-5 color negative film with masking couplers, making it possible to improve the quality of color reproduction.

The eighth Cinerama motion-picture theater was opened in the U.S.S.R. (City of Perm) during 1960. The improvement of the equipment for Cinerama was continued. A new 23PTK-I printer was designed for motion picture films (Fig. 103). It permits a higher accuracy and quality of prints. The luminance at the film gate of the printer exceeds 400,000 lm. The printer runs at a rate of 2000 ft/hr when low-speed, color

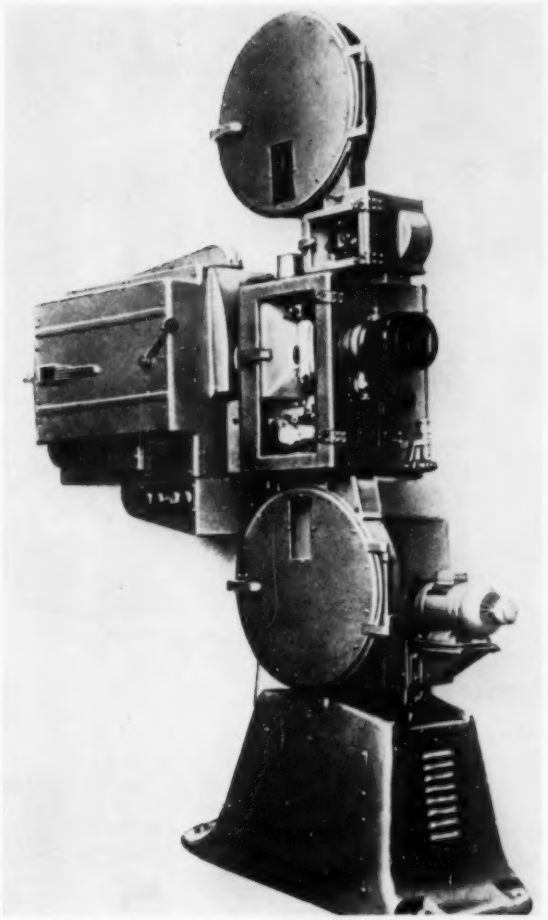

Fig. 104. 35 SKP-Sh motion-picture projector with a 1-kw xenon lamp.

Fig. 105. Meter for checking the luminance of motion-picture theater screens.

Fig. 106. KPU-59 amplification arrangement with germanium transistors for portable motion-picture projectors.

positive is used. The resolving power is 50 to 60 lines/mm.

The Central Studio of Documentary Films produced another Circarama program called *Vienna Festival*. In the Summer of 1960 a Circarama theater was opened in Prague, Czechoslovakia. It has Soviet equipment and shows Soviet films.

Equipment for Showing Ordinary and Wide-Screen Films

In addition to designing the two universal 70/35mm projectors with high luminous flux, some new types of projection equipment were designed for installation in clubs and small theaters. These include the new 35 SKP-Sh-type projector (Fig. 104), used for showing wide-screen and ordinary 35mm films. A 1-kw xenon lamp, which provides for a luminous flux up to 3000 lm, was used as the light source.

Xenon lamps (3-kw) of high luminance have been designed for motion-picture projection. The experimental models of projectors equipped with these lamps showed that it was possible to obtain effective luminous fluxes up to 12,000 lm for wide-screen projectors with anamorphic optics. Since July, 1960, the wide-screen theater Leningrad has operated in Moscow successfully with projectors having 3-kw xenon lamps.

The YaKP luminance meter (Fig. 105) was designed and marketed for an objective control of luminance on screens in motion-picture theaters. The instrument can be used for direct measurement of luminance within a range from 3 to 200 units in a controlled angle of measurement of 1.5°.

New VGK-60 rectifiers with germanium diodes are used to provide direct current for 60 amp arc lamps in motion-picture projectors. These designs have an efficiency up to 77% and they provide for an automatic stabilization of current by magnetic amplifiers. A rectifier with germanium diodes and automatic lamp current stabilization has been designed to provide current for the 1-kw xenon lamps.

For portable motion picture equipment designed with germanium transistors (Fig. 106), KPU-59 amplifiers are manufactured. These amplifiers are used for the reproduction of photographic and magnetic soundtracks. Their size and weight are 1.5 to 2 times smaller at an output capacity of 15 w than the size and weight of analogous amplifiers equipped with electronic tubes. A 25-w 35 UZU-I amplifier with a pre-amplifier of transistors has been marketed for professional stationary 16mm projectors.

Motion-Picture Sound Recording Equipment[115]

New types of apparatus used for recording sound in motion-picture production were designed in the Soviet Union in 1960, permitting a substantial improvement in sound quality. Small-size cassette amplifiers are used in KZM-

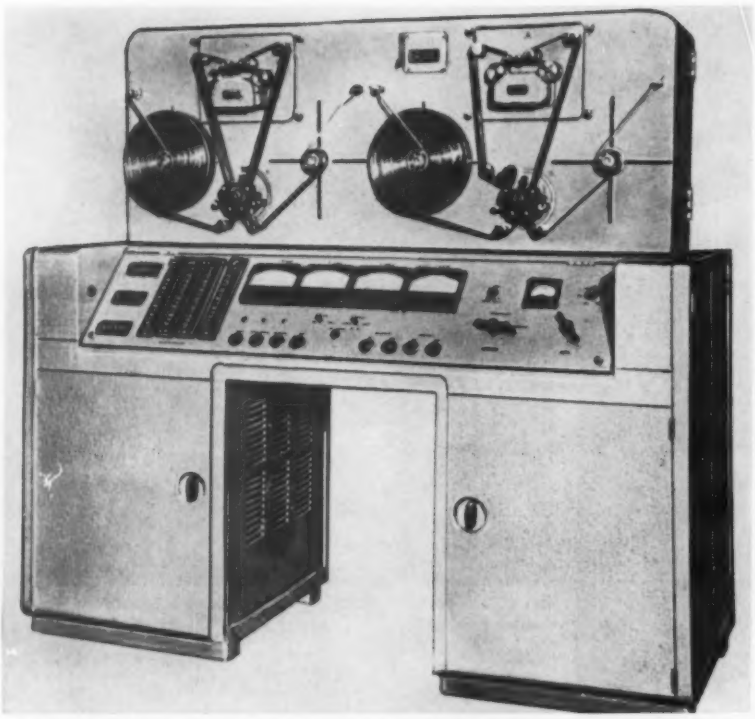

Fig. 107. KMP-5 apparatus for printing 4-channel stereophonic soundtracks.

Fig. 108. 19A-9 condenser microphone.

8 instruments for synchronous single-channel magnetic recording of sound on 35mm perforated tape, and KZM-7 instruments for 4-channel stereophonic recording of sound.

The KMP-5 apparatus (Fig. 107) has been designed for printing 4-channel and single-channel magnetic soundtracks on a 35mm tape. More advanced apparatus has been designed for re-recording of single-channel soundtracks (KPZ-II) for producing non-stereophonic films. The apparatus has six inlets for magnetic soundtracks and two for photographic soundtracks. The frequency characteristic is rectilinear within the limits of 40 to 12,000 cycles, while the level of distortion is not more than 55 db when measurements are made according to "white" noise.

A portable tape recorder, working with nonperforated $\frac{1}{4}$-in. tape (KZM-9), has been designed for synchronous recording of sound under field conditions. The synchronization is controlled by the recording of the pilot signal on a magnetic tape at the same time with the soundtrack. The tape is run at a speed of 7.7 in./sec by a spring motor equipped with a speed regulator, while the amplifier is powered by a silver-zinc storage battery, through a transistor converter.

The KMP-2 apparatus is used for synchronous printing of soundtracks recorded with the tape recorder on perforated 35mm tape from a $\frac{1}{4}$-in. magnetic tape. An improved light modulator (2D-8) has been designed with a tape oscillograph, which makes it possible to obtain higher quality from the photographic soundtrack.

The industry has released a new 19A-9 condenser-type microphone (Fig. 108) for recording speech and music in film production. The microphone has a cardioid direction control and the working range of frequencies is 40 to 15,000 cycles.

Equipment for Printing and Processing Films

The 25 KMK-I printers (Fig. 109) for contact printing of substandard black-and-white and color release prints on 32mm film stock have gone into production. The intermittent printing method adopted permits high resolving power and accuracy at a printing rate of up to 3300 ft/hr. The photographic soundtrack can be printed at the same time as the picture.

The MP-6 machine has been designed for coating magnetic tracks on 16mm and 35mm release prints under operating conditions existing in motion-picture and television studios. It can be used for coating magnetic tracks on both the finished release prints and the unexposed film.

A new model 60P-3 developing machine has been released by the industry for processing both 35mm and 16mm black-and-white films in daylight. The machine is for processing film used for recording various events in laboratories, for scientific research and other recording applications.

Figure 110 shows the 72P-I machine for restoration or renovation of 35mm and 16mm black-and-white and color release print and negative films. In addition to restoring the emulsion layer and support, the machine can be used for applying protective lacquer coats and replacing these after they have worn out or become dirty. The negatives are processed at a rate of 1600 ft/hr and positives at 3300 ft/hr.

New equipment and the necessary techniques have been worked out for mass production printing of color release prints from multilayer color negatives by the dye transfer process. Silver halide separation matrix films are used in the process for printing matrices directly from the color negative, while the positive is printed on a blank film with a mordant in the receiving layer. The dye is transferred from the matrix onto the blank film on a special 35-GM-2 machine, on which the films after registration travel through the transfer machine without any pin belt. The output capacity of the machine is 6500 ft/hr of positive.

Venezuela

Due to the economic situation prevailing in 1960, film production in Venezuela has been confined entirely to documentaries and advertising shorts,

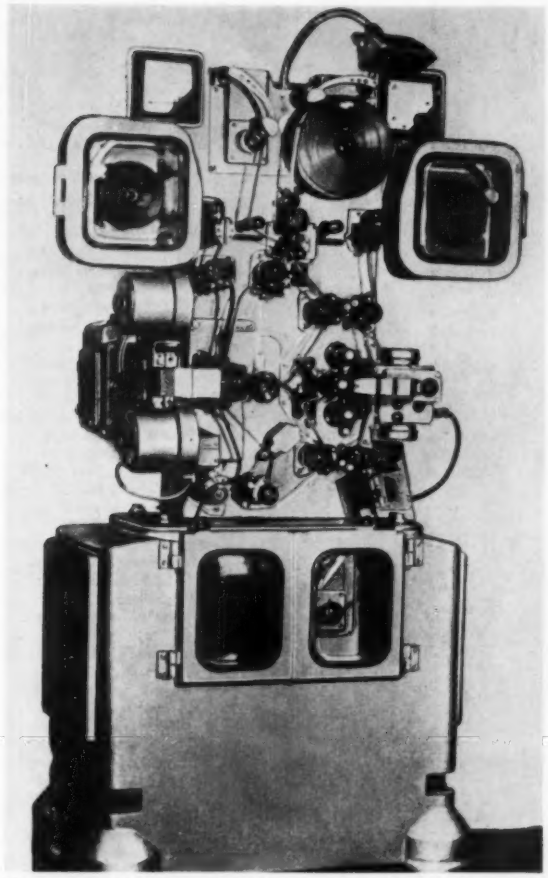

Fig. 109. 25KMK-I motion-picture printer for printing substandard black-and-white and color release prints.

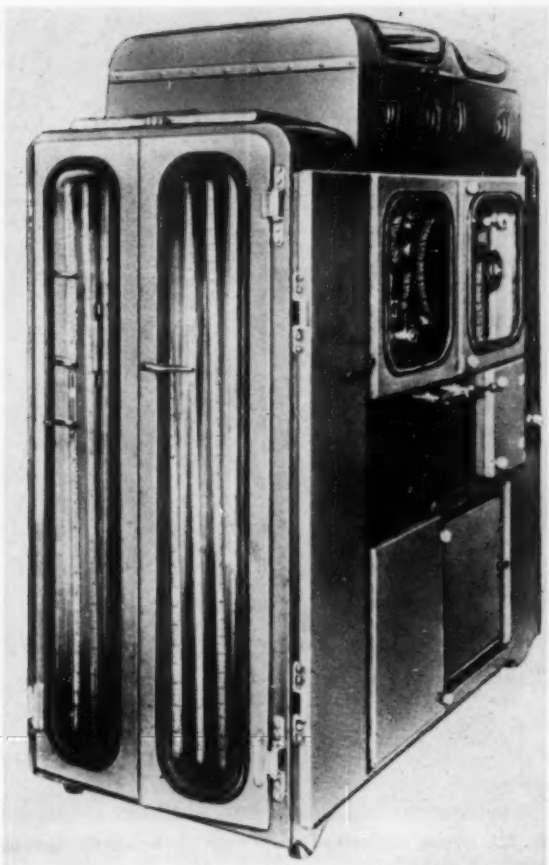

Fig. 110. 72P-I restoration machine for color and black-and-white release prints and negatives on 35mm and 16mm films

although several feature films had been planned.

Bolivar Films, the oldest and largest producer and laboratory in the country, continues to produce and process newsreels, publicity shorts and documentaries, both in black-and-white and Eastman Color. They also produce a daily TV newsreel, *El Observador Creole*, sponsored by the Esso Petroleum Corp. Cedesa, a relatively new company dedicated to the production of publicity shorts both for TV and cinema, installed the first Oxberry Animation Stand in Venezuela.

Cinelaboratorios Caribe is now installed in a new, specially designed building, where some 5000 sq ft are allocated to the processing laboratory, and 2500 sq ft of additional space reserved for production facilities, cutting rooms, etc. The laboratory includes black-and-white processing 35mm and 16mm, negative and positive (Fig. 111). Eastman Color is processed on a Debrie D.U.C.20N machine, one side handling the negative process, the other positive. Either 35mm or 16mm can be handled. Color printing is carried out on a Debrie Matipo-Color step printer. Color is controlled additively, by means of fixed tricolor filters and a photographically prepared travelling matte, 40 light change points being available for each color. Sound is printed simultaneously at a separate printing head; four different lengths of automatic fade are available.

Gama Films also transferred to new and larger premises. Their original animation equipment has been replaced by an Oxberry Stand, and their processing equipment has been rebuilt to produce a higher output, but otherwise the processing facilities are the same as reported previously (see 1958 Progress Report in the May 1959 *Journal*). Installation of magnetic and optical sound facilities is now underway, which will convert Gama Films into a completely self-contained production unit.

El Instituto Venezolano de Investigaciones Cientificos (I.V.I.C) completed three documentaries this year, all in 35mm color with sound. The first, *Estudio In Vitro del Ancylostoma Caninum*, of some fourteen minutes duration, included an unusual shot through a microscope of an ancylostom feeding, accompanied by the synchronized sound of the parasite sucking blood. Both English and Spanish versions of this film were produced. *Ojo con el Anquilostomo* is a seven-minute nontechnical treatment of the dangers of this parasite, showing how infection is caused, and its results. The third film, *Técnica de difusión en gel para diagnósticos de diversos procesos con desintegración celular*, (nine minutes) received an award at the First International Congress of Medical Photography and Cinematography in Düsseldorf, Germany, where the quality of the color photography received favorable comment. Versions have been prepared in English, Spanish, French and German, in both 35mm and 16mm. Eastman Color was used for all three films, processed in Venezuela by Cinelaboratorios Caribe.

The Film Unit of the Ministry of Education produced a twenty-minute color documentary, 35mm, on the Island of Margarita, which was processed in Venezuela.

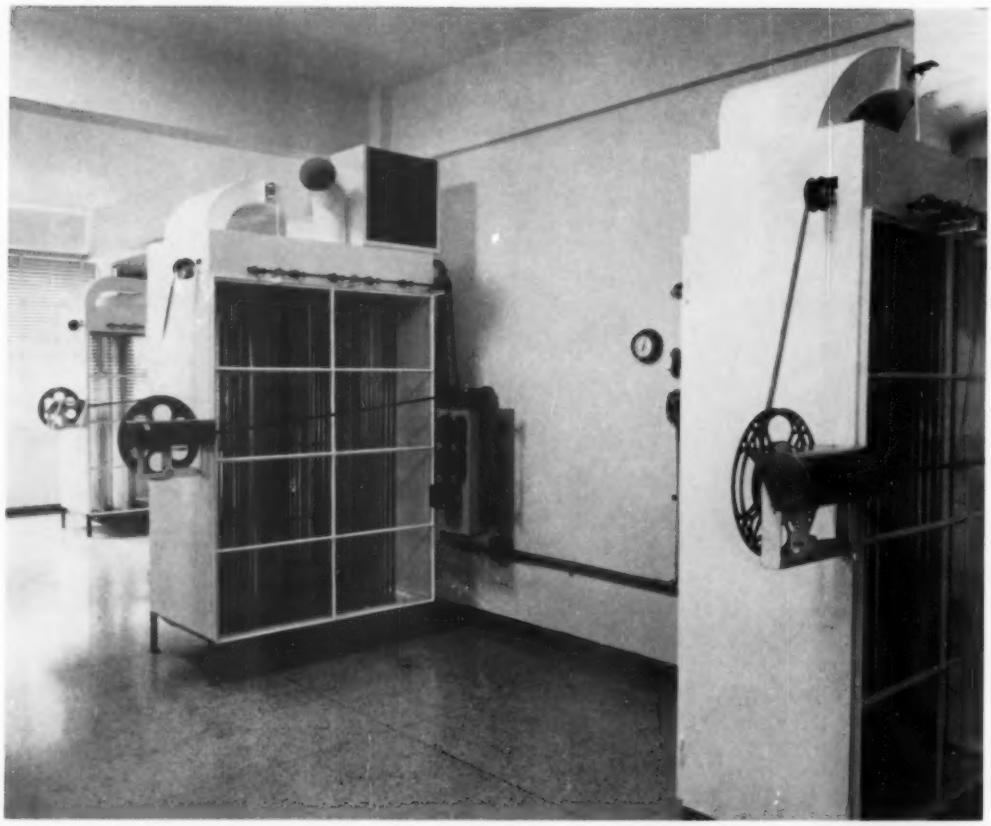

Fig. 111. Drying cabinets of locally built black-and-white processing machines, Cinelaboratorios Caribe, Caracas, Venezuela.

Shell Film Unit was transferred to the Shell Petroleum Co.'s new building in Caracas, where the well-planned installation of the Sound Recording Department is of particular interest. The dubbing theater is acoustically treated for small orchestra recording, and measures 8 by 12 m, and 6 m in height. One wall has eight panels with adjustable wooden louvres for varying reverberation. Soundproof windows separate the theater from a commentator's booth 2 by 2 by 3 m. Two Ross 35mm projectors equipped with RCA optical/magnetic soundheads, plus two RCA optical/magnetic reproducing soundheads provide four channels for dubbing, in conjunction with an RCA console including all equalization facilities, tele-effects and single-line compression. A library of more than 1000 sound effects collected in Venezuela is stored on $\frac{1}{4}$-in. tape, as well as many examples of folk songs, Indian chants, etc. The new building also contains a cinema, seating just over a hundred persons, equipped with two Philips projectors and facilities for both wide-screen and normal projection. The Film Unit in addition to normal production facilities maintains a large library of Shell films from all over the world, which are lent free of charge to interested organizations. Part of the work of the Film Unit in Venezuela is to prepare Spanish versions of films from other countries.

Tiuna Films, one of the most prolific producers of publicity and documentary films, continues to operate with the same facilities mentioned in previous Progress Reports. Having their own studios, sound recording equipment, and black-and-white processing laboratory, only color processing is sent out. T.V. Films Universal, a small production company working entirely in 16mm, installed a Debrie Aiglonne processing machine, set up for 16mm reversal. Other equipment includes a Magnasync 16mm dubbing system, with an RCA sound camera for final transfer.

In the field of television, the only notable change is the disappearance of Televisa (Channel 4), which ceased to exist early this year after a series of financial difficulties. It is said that a new company has been formed to take over the plant, but no details are available as yet. Radio Caracas Television (Channel 2) and Televisora Nacional (Channel 4) continue to operate.

Conclusions

The new technical achievements described in this Progress Report demonstrate the vigor with which the motion-picture and television industries are continuing to develop. If some items of interest have been omitted, it is only through oversight or because our information gathering has been imperfect. It is realized that some duplication between the individual reports exists, which is inevitable in a Committee Report of this nature. The Chairman wishes to thank the many members of the Committee and all who assisted them for their individual contributions, which make the Progress Report possible.

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A Method of Analyzing High-Speed Films

By FRANZ TOPFER

When time-motion curves are plotted from high-speed films, the feeding steps of the tracing paper must be exactly proportional to the time interval between frames. Ordinarily the length of each feeding step must be determined by a preliminary measurement of the frame rate. This inconvenience is avoided by the procedure described here, which consists in photographing on each frame of the film a timing instrument with a rotating scale. The film analyzer is equipped with a duplicate of the timer dial, and the rotation of this duplicate dial is proportional to the movement of the tracing paper. As the film is advanced from one frame to the next, the paper is advanced independently until the dial on the analyzer stands at the same position as the image of the dial on the new frame of the film. The feeding step of the tracing paper is thus automatically proportional to the time interval between the new frame and the preceding one. The ratio of the rotation of the dial to the linear feed of the paper can be varied to give any desired time scale for the resulting time-motion curve.

FOR ACCURATELY analyzing high-speed films and especially for plotting time-motion curves, an analyzer of the general type shown in Fig. 1 is ordinarily used. Each frame in turn is imaged on the translucent screen facing the operator in such an orientation that the motion of the image of the body under study takes place forward and backward with respect to the operator. The motion of the body is thus represented by the ordinates of the resulting curve. This curve is drawn on a strip of tracing paper that is moved sideways between frames by a distance that is proportional to the time interval between frames in the camera. The abscissas of the curve therefore represent time.

The projector shown in Fig. 1 was especially designed for motion analysis of this sort. The beam coming downward from the projector lens is reflected to the back of the translucent screen by a first-surface mirror. A rotatable Dove prism placed before the lens enables the image on the screen to be rotated so that the motion under study will be accurately normal to the direction of movement of the paper. The film speed can be varied at will, and no flicker is seen even at 2 frames/sec. The film can also be advanced frame by frame by means of a pedal.

Making a time-motion curve obviously involves a knowledge of the time interval that corresponds to each frame interval. To enable this to be determined, a common procedure is to make a periodic mark on the

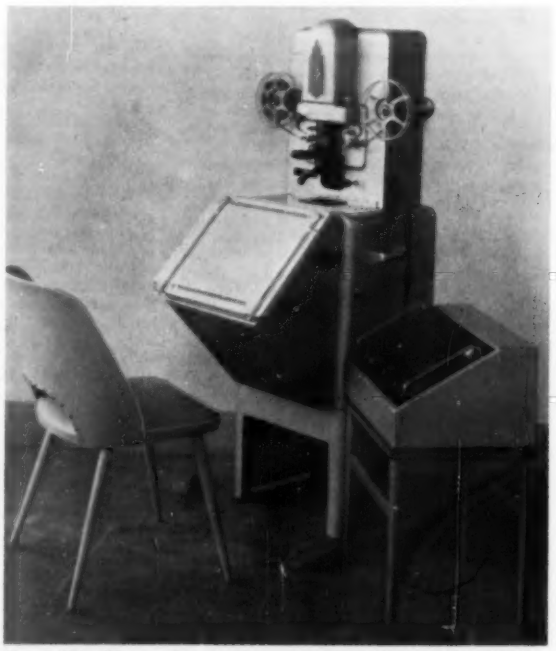

Fig. 1. The film analyzer subsequently modified as described.

Presented on October 21, 1960, at the Fifth International Congress on High-Speed Photography in Washington, D.C., by Franz Topfer, Comité National Belge D'Optique, International Scientific Film Assn., Liège, Belgium.

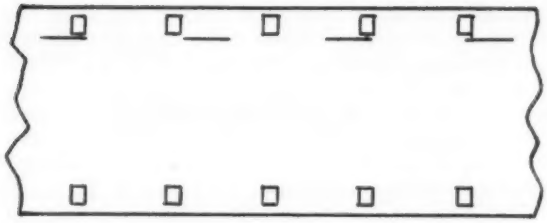

Fig. 2. Typical time marks on film.

film in the camera as shown in Fig. 2. This can be done by means of a small glow lamp fed by a stabilized generator that produces, say, 100 pulses/sec. Then the distance between the start of one mark to the start of the next represents 1 msec (millisecond) and the speed of the film in units of distance per second is 1000 times this distance.

The importance of determining this speed is indicated by Fig. 3, which shows the speed at each point of a 30-meter film as a function of distance along the film for three cameras of different characteristics. For even the best camera (curve 1), the speed increases rapidly until about a third of the film has been wound off and is still rising slightly even when the film ends. The camera represented by curve 3 hardly even gets up to its final speed when the film ends; and the camera represented by curve 2 shows a quite different characteristic — the speed attaining a maximum when the film is half used and then decreasing for the rest of the run.

The method of determining film speed just described is clumsy and becomes time consuming when a large amount of film is to be analyzed. The necessity for making calculations is entirely avoided by photographing on each frame the rotating dial shown in Fig. 4 and using a suitable analyzer. This type of time registration was commonly used before the timing-light marks were adopted; the novel part of the procedure is the device used on the analyzer to obtain the proper stepping distance for the paper without making computations.

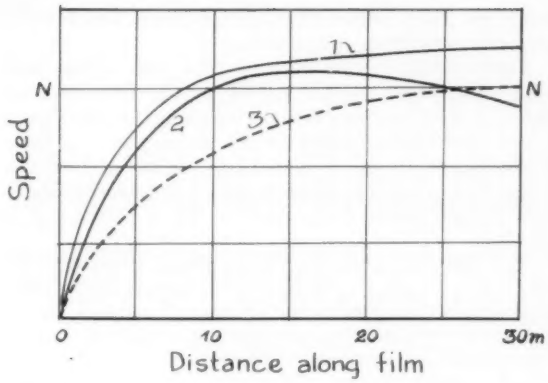

Fig. 3. Curves of film speed vs. distance along the film, for three different cameras.

The rotation of the dial must, of course, be steady, but it has been found that the speed of a synchronous motor is adequately constant. The speed of the dial is determined by a suitable gearbox. The most appropriate speeds have been found to be 10, 20 and 40 rps so that each division represents 1, 0.5 or 0.25 msec. It is not even necessary to photograph the entire dial, only a small region around the index being of interest.

In the film analyzer (Fig. 1) the tracing paper (not shown) unrolls from a feed spool on the righthand side of the translucent screen, crosses the screen, goes over an idler and is wound up on the take-up spool at the left. The paper is advanced manually by rotating a knob on the end of the take-up spool. The tractive stress is made very slight to avoid stretching the paper and thus deforming the curve.

The calibrating device is the dial shown in Fig. 5, which is an exact duplicate of the dial that was photographed in Fig. 4. This dial is turned by means of the shaft shown in the middle of Fig. 5. This shaft terminates in a sprocket wheel that presses on the idler over which

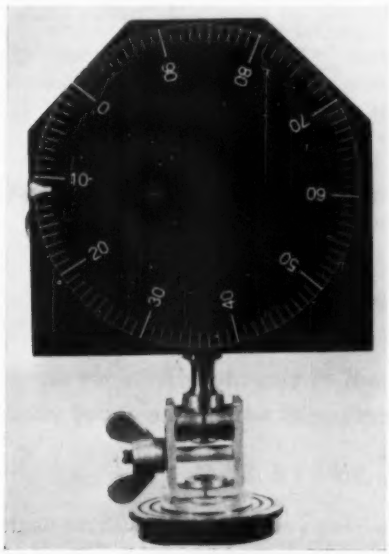

Fig. 4. The rotating dial, photographed on each frame.

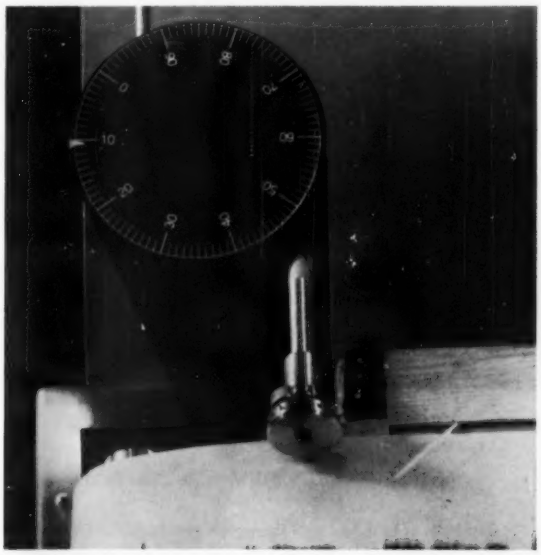

Fig. 5. Duplicate dial that indicates the extent of the advance of the paper.

the paper passes so that its rotation is proportional to the distance traveled by the paper.

Plotting time-motion curves is now very simple and rapid. The paper and film are fed into the machine, and the dial of the analyzer is set to correspond to the image of the dial photographed in the first frame. As each frame is brought into view, the paper is moved until the dial of the analyzer again corresponds to the image of the dial on the frame being studied and a new point is plotted.

The dial on the analyzer is connected to the shaft of the sprocket wheel by means of an adjustable gearbox that makes one division of the dial correspond to an advance of 1, 2 or 4 mm of paper. Since one division of the dial in the image represents 1, 0.5 or 0.25 msec, the time scale of the time-motion curve is known directly and is constant regardless of the speed of the film. Moreover, when the motion being plotted does not change rapidly with time, any number of frames can be skipped and the paper will still be in step with the film if a modicum of care is taken to avoid skipping complete turns of the dial in counting.

This film analyzer has been patented in several countries and a license has been given for manufacturing it. It has been found to be very satisfactory for tracing time-motion curves with high precision and, since no measurements or calculations are needed, with astonishing rapidity.

Méthode d'analyse des films à grande vitesse

FRANZ TOPFER

Quand on trace des courbes de mouvement en fonction du temps à partir de films à grande vitesse, les phases d'avance du papier-calque doivent être exactement proportionnelles à l'intervalle de temps entre les images. Ordinairement, la longueur de chaque phase d'avance doit être déterminée par un mesurage préliminaire de la cadence d'images. On peut éviter cet inconvénient par la technique décrite ici, qui consiste à photographier sur chaque image du film un instrument chronométreur à échelle rotative. L'analyseur de films est muni d'une réplique du cadran du chronométreur et la rotation de ce cadran-réplique est proportionnelle au mouvement du papier-calque. Lorsque le film avance d'une image à la suivante, le papier est avancé indépendamment jusqu'à ce que le cadran de l'analyseur occupe la même position que l'image du cadran sur la nouvelle image du film. Ainsi, la phase d'avance du papier-calque est automatiquement proportionnelle à l'intervalle de temps entre la nouvelle image et l'image précédente. On peut varier le rapport entre la rotation du cadran et l'avance linéaire du papier de manière à obtenir toute échelle de temps désirée pour la courbe résultante du mouvement en fonction du temps.

Un método para analiza unas películas de gran rapidez

FRANZ TOPFER

Cuando las curvas de tiempo y de movimiento de unas películas de gran rapidez están trazadas, los pasos de alimentación para el papel de copía deben ser exactamente proporcional al intervalo de tiempo entre las fotogramas. Ordinariamente la largura de cada paso de alimentación debe ser determinado por una medida preliminar de la tasa de movimiento de cada fotograma. Se puede evitar esta inconveniencia por el procedimiento descrito aquí, el que consiste en fotografiando un instrumento de tiempo con una escala de rotación en cada fotograma de la película. El analizador está equipado con un duplicado del cuadrante del marcador de tiempo, y la rotación de este cuadrante duplicado as proporcional al movimiento del papel de copía. Cuando la película está avanzada de una fotograma á la proxima, el papel está avanzado independiente hasta que el cuadrante del analizador está en la misma posición que la imagen del cuadrante en la fotograma nueva de la película. De esta manera el paso de alimentación del papel de copía es automaticamente en proporción con el intervalo de tiempo entre la fotograma nueva y la anterior. La razón de la rotación del cuadrante á la alimentación lineal del papel puede ser variada para dar cualquiera escala de tiempo deseada para la curva resultante de tiempo y de movimiento.

Eine Analysiermethode für Zeitlupenfilme

FRANZ TOPFER

Wenn man nach Zeitlupenfilmen Kurven anlegt, die Zeit und Bewegung darstellen, muss der Vorschub des Zeichenpapiers in genauem Verhältnis zum Zeitintervall zwischen den einzelnen Aufnahmen stehen. Gewöhnlich ist es nötig, vorerst die Aufnahmegeschwindigkeit zu messen, um die Länge jedes einzelnen Vorschubes zu bestimmen. Dieser Nachteil wir gemäss der hier beschriebenen Methode dadurch vermieden, dass bei jeder Aufnahme ein Zeitmessgerät mit rotierender Skala mitphotographiert wird. Das Filmanalysiergerät ist mit einer ganz gleichartigen Skala ausgestattet und die Drehgeschwindigkeit derselben ist proportional dem Vorschub des Zeichenpapiers. Sobald der Film von einem Bild zum nächsten vorwärtsbewegt wird, wird das Papier unabhängig davon so lange vorgeschoben, bis der Anzeiger des Analysiergeräts in derselben Stellung ist, wie die auf der Aufnahme auf dem nun vorwärtsgebrachten Film gezeigte. Die Vorschubbewegung des Zeichenpapiers wird dadurch automatisch dem Zeitintervall zwischen den beiden Filmaufnahmen proportional sein. Das Verhältnis zwischen der Drehgeschwindigkeit des Anzeigers und dem linearen Vorschub des Papiers kann so verstellt werden, dass sich Kurven mit beliebig grosser Zeitskala erzielen lassen.

Call for Information

About Requirements for Education for High-Speed Photographers

During 1960 and the concentrated activity for the Fifth International Congress on High-Speed Photography, sponsored by the SMPTE, Congress Chairman Max Beard was able to lay the groundwork for eventually establishing the relationship between supply and demand for education for high-speed photography. A questionnaire was sent to 199 colleges and universities; 124 replied — their answers and supplemental data are being organized by Mr. Beard.

Given below are some details about the activities of the Society's Education Subcommittee of the Instrumentation and High-Speed Photography Committee. The matter of primary importance is

Information Needed for Evaluation of Educational Requirements for Photographic Instrumentation in Industry and Government

(For the sake of simplicity in preparing your advice for Mr. Beard, the term "photographic instrumentation" should encompass scientific, industrial, or research photography; photographic engineering or technology.)

QUERY A — TO Technical Photographers in photographic instrumentation: Do you recognize a need for college training in the physical sciences, mathematics or engineering for your particular work or group assignments?

If so, please list courses of study, such as metrology, electronics, chemistry, etc. It would be helpful to know also the recommended level of advancement in each study, as for example, mathematics through calculus, etc.

QUERY B — TO Engineers or Scientists in photographic instrumentation: Do you recognize a need for college training in photographic optics, photographic chemistry, sensitometry, high-speed photography or other specialized photographic training for your particular work or group assignments?

If so, please list the courses of study (or specialty) and a level of advancement if determinable.

Queries to All

(1) Do you, as an active worker in photographic instrumentation, have any recommendations for students who are planning their curricula for careers in photographic instrumentation?

(2) Please indicate the field of endeavor most closely allied to your work, such as research, engineering, industrial testing or other scientific and technical fields.

(3) Is your work primarily data recording, high-speed photography, photographic equipment design, engineering of photographic systems, photoelectronics, photooptics, or some other form of photographic instrumentation?

(4) What specialized training have you had in science, engineering, mathematics or technical photography applicable to your work in photographic instrumentation? If you have a degree, please state your major.

If you wish your name and organization kept confidential please note that in your letter-report, and you will not be identified in the Subcommittee's reports.

Please forward your reply to the Chairman of the SMPTE Instrumentation and High-Speed Photography Subcommittee on Education:

MAX BEARD, 10703 E. Nolcrest Drive, Silver Spring, Maryland

SOME BACKGROUND: In recent years the SMPTE Engineering Committee on Instrumentation and High-Speed Photography has been concerned with the education and training of recruits for the field. Concurrent with the activities to make the Fifth Congress Program last year and to promote interest in it, a questionnaire was sent to 199 major colleges and universities; and, as noted above, 124 of them have replied. This growing activity of surveying and analyzing

education and high-speed photography has been carried by the Fifth Congress Chairman after the successful conclusion of his Congress by co-ordinating it with the Society's Education Committee. The program is in four parts.

(1) *Survey* the nation's educational institutions. They have already been canvassed, as mentioned above, and a digest of the data is in preparation. Many interesting responses were obtained from certain institutions which are expected to be particularly helpful through further communications.

(2) *Survey and analysis* of the requirements of research, development and engineering activities in government and industry. Replies to the Call for Information above will supply the essential data for determining the complexity of course requirements and for evaluating the number of people involved.

(3) *Determination of course requirements* for the greatest benefit to: (a) scientific photographers who need courses in engineering and the physical sciences: (b) engineers or scientists who need courses in scientific photography; and (c) students interested in obtaining their degree in curricula planned for careers in photographic instrumentation as applied to research, development and engineering.

(4) *Recommendations* to interested colleges and universities that they incorporate certain courses into their curricula. Grants from industry and government activities might be made available to assist in the establishment of these courses; however, establishment of grants would not be a function of the Educational Subcommittee.

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standards and recommended practices

Proposed SMPTE Recommended Practice and American Standard

Two proposals initiated by the Video Tape Recording Committee are published here for a three-month period of trial and comment:

Proposed SMPTE Recommended Practice RP 10, Signal Specifications for a Monochrome Video Alignment Tape for 2-in. Video Magnetic Tape Recording

Proposed American Standard VTR 16.3, Specifications for Monochrome Video Magnetic Tape Leader

VTR 16.3, published in the November 1959 *Journal* for a three-month trial period, was returned to the initiating committee for revision following receipt of industry suggestions for modification. Subsequently, a redraft was submitted to and approved by the Video Tape Recording and Standards Committees.

Comments on VTR 16.3 and RP 10 should be forwarded to Alex E. Alden, Staff Engineer, at Society Headquarters, not later than August 15, 1961. If no adverse comments are forthcoming by this date, VTR 16.3 will be submitted to the American Standard Association for further processing as an American Standard and RP 10 will be submitted to the Society's Board of Governors for approval.

Proposed SMPTE Recommended Practice RP10

Signal Specifications for a Monochrome Video Alignment Tape for 2-In. Video Magnetic Tape Recording

1. *Scope*

1.1 This recommended practice specifies the signals to be recorded on a magnetic video tape for use in evaluating and adjusting the performance of monochrome video tape recording and playback equipment on a routine operational basis. The characteristics which can be checked primarily are related to the video performance although a cursory check of the audio channel is included for operating convenience.

1.2 Specifically, the recorded signals on the tape provide means for check of the following characteristics or adjustments:

(a) video-head quadrature
(b) tape vacuum guide position
(c) video levels
(d) video amplitude-frequency response
(e) video transient response
(f) video low-frequency tilt
(g) video amplitude linearity
(h) video-head playback sensitivity
(i) relative noise banding
(j) r-f carrier deviation frequencies
(k) program and cue track audio levels
(l) control track levels and phase

2. *Recorded Signal Characteristics*

2.1 The video signals recorded by the video heads shall occupy sequential bands from top to bottom in the reproduced picture, each of which corresponds to a single traverse of a video head across the tape. For the purpose of identification, these bands are designated as one through sixteen. The first band after that containing the vertical synchronizing pulse interval shall be designated as band one. (Band one will contain fewer active lines than the other bands because it contains a portion of vertical blanking.) The active picture portion of the horizontal scan shall be divided into eleven equal sections. For the purpose of identification, these sections are designated as zero through ten. Information shall be recorded as follows:

	Information	*Bands*
2.1.1	A stairstep signal consisting of a ten-step linear gray scale extending from blanking level to 100 IRE units respectively, as shown in Fig. 1.	1 through 4
2.1.2	A stairstep signal consisting of a five-step linear gray scale extending from black level to 50 IRE units respectively, as shown in Fig. 2.	5 through 8
2.1.3	A series of five sine-wave bursts, as shown in Fig. 2, and described as follows: The time sequence of the burst frequencies shall be 4.2, 3.6, 3.0, 2.0 and 1.5 mc. The axis of the multiburst shall be at 30 IRE units, and the peak-to-peak amplitude shall be 40 IRE units. Each burst duration will be at least 75% of the section width.	5 through 8
2.1.4	A window signal at reference white level (100 IRE units) three sections wide and six bands high to be positioned horizontally in sections six, seven and eight, as shown in Fig. 3, and vertically between the centers of the ninth and fifteenth bands. The remaining section shall be at blanking level (0 IRE units).	9 through 15

	Information	*Bands*
2.1.5	Vertical synchronizing pulse interval and a portion of vertical blanking.	Band 16 Only
2.1.6	Sine-squared pulses of $\frac{1}{8}$-microsecond width (measured at half level) and 50 IRE units in height at horizontal positions corresponding to the center of each of the first six sections. The base level of each sine-squared pulse shall be as follows: (a) Bands 1 through 8, the same as the accompanying stairstep section level, as shown in Figs. 1 and 2. (b) Bands 9 through 15, at blanking level, as shown in Fig. 3.	1 through 15

2.2 The waveform of the composite signal shall appear as shown in Fig. 4.

2.3 All synchronizing waveforms and signal amplitudes shall conform with EIA Standard RS-170 or the latest revision thereof.

2.4 All video signals shall be within ± 1 IRE unit of specified amplitudes.

2.5 Rise and decay time of window and stairstep signals shall not exceed 0.003 H (0.3% of the horizontal scanning period).

2.6 Overshoot of window and stairstep signals shall not exceed 5% of the amplitude of transition. An exception is the trailing edge of stairstep (leading edge of horizontal blanking) which is limited to 2% in accordance with EIA Standard RS-170 or the latest revision thereof.

2.7 Multiburst frequencies shall conform with specified values within 1%. Total harmonic distortion content of the multiburst frequencies shall not exceed 2%.

2.8 The audio tone and cue records shall consist of an audio tone interrupted periodically with voice announcements.

2.9 (a) The audio tone shall be 400 cps $\pm 2\%$ recorded at a level 10 db below that corresponding to a 3% total harmonic distortion at 400 cps.

(b) The audio response-frequency characteristics shall be as specified in Proposed American Standard Characteristics of the Audio Records for 2-In. Video Magnetic Tape Recordings, VTR 16.5, or the latest revision thereof.

2.10 The voice announcements shall be made at one-minute intervals and shall not exceed 20 seconds in duration. The announcement shall provide identification of the tape as regards the applicable SMPTE Recommended Practice, the tape issue number, and the manufacturer of the standard tape. Additional identification (such as serial number) may be included at the discretion of the manufacturer.

3. *Recording Conditions*

3.1 The video alignment tape shall conform with applicable American Standards and SMPTE Recommended Practices.

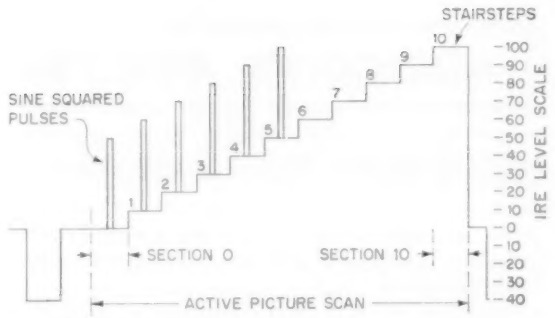


Fig. 1. Bands 1 through 4.

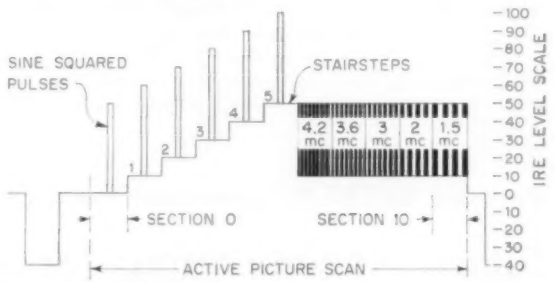


Fig. 2. Bands 5 through 8.

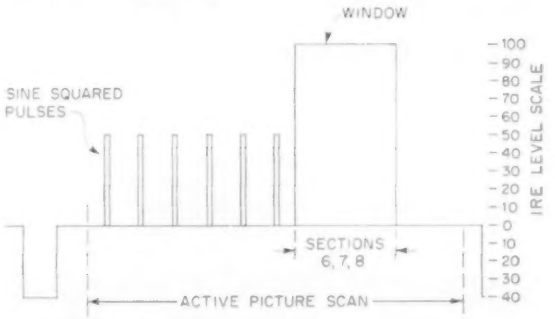


Fig. 3. Bands 9 through 15.

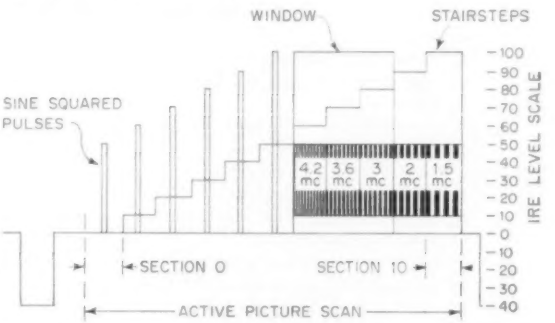


Fig. 4. Composite waveform. Waveforms shown at line rate sweeps.

Proposed American Standard

Specifications for Monochrome Video Magnetic Tape Leader

VTR 16.3

1. Scope

This standard specifies the audio and video information that precedes and follows the recorded program material (for purposes of insuring uniformity of reproduction), and provides the necessary identification "cue up" and "run out" information. The standard also specifies the minimum lengths of tape required to ensure proper "threading" and "wrap around" for monochrome video-tape recordings.

2. Alignment Signal

2.1 At the head end of the tape, at least 35 seconds of test pattern shall be recorded at the same level and under the same conditions of equipment adjustment used for recording the video program material. (It is desirable that test pattern or test signal include reference black and reference white information. The signal should be of such a nature as to facilitate vacuum guide adjustment, e.g., stairstep signal.)

2.2 Simultaneously, a reference level audio tone of 400 cps (cycles per second) ± 5 per cent shall be recorded at the same level and under the same conditions of equipment adjustment used for recording the audio portion of the program material.

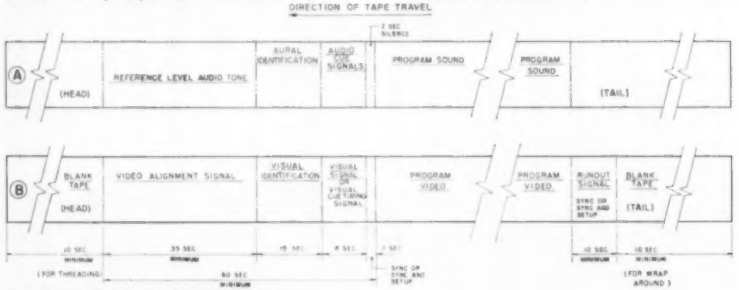
2.3 The alignment signal shall be preceded by at least 10 seconds of blank tape for "threading" purposes.

3. Identification Information

3.1 Visual identification information shall be recorded for at least 15 seconds following the video alignment signal specified in Section 2. The identification shall contain, as a minimum:

(1) title
(2) subject
(3) production number
(4) "take" number
(5) recording studio name
(6) date of recording

3.2 Simultaneously, an aural identification of the information specified in Section 3.1 should be recorded under the same conditions as defined in Section 2.2.



A = Sound portion of video tape leader
B = Video portion of video tape leader

NOT APPROVED

4. Cue Timing Signals

4.1 Audio cue signals, as described below, shall be recorded on the audio program track following the visual identification signal specified in Section 3.

4.1.1 The audio cue tone signals shall consist of a series of 400 cps ± 5 per cent bursts, each of $^1/_3$-second duration, occurring at one-second intervals over the range from ten or more seconds ahead of the program material to two seconds ahead. The recording level shall be as defined in Section 2.2.

4.1.2 In addition, a steady component of the audio cue tone shall be recorded approximately 20 db (decibels) below the level used in Section 4.1.1 above, starting with the first tone burst and ending with the last one, to leave a two-second silent interval before the start of program material.

4.2 A visual signal shall be recorded during the entire period of the steady component of the above-described audio tone signals. Sync (or sync and setup) only shall be recorded during the two-second interval from the end of the tone bursts to the start of program. The recording level shall be as described in Section 2.1.

If a visual cue timing signal is used, it shall be coincident with and identify the tone burst in Section 4.1.

5. Continuity of Recorded Signals

Continuity of recorded signals, beginning with the video alignment signal, shall not be interrupted. This continuity shall be achieved by continuous recording or by equivalent splicing, provided that the requirements of Section 2.1 are fulfilled.

6. Run-Out Signal

6.1 There shall be at least 10 seconds of sync (or sync and setup) recorded immediately following the conclusion of program material.

6.2 The run-out signal shall be followed by at least 10 seconds of blank tape for "wrap around" purposes.

90th SMPTE Convention

Lake Placid Club, Essex County, N. Y., October 2–6, 1961

Theme: **Integration of Motion-Picture and Electronic Systems**

Program Chairman: **C. Loren Graham,** Kodak Park Building 65, Rochester 15, N.Y.

TOPICS AND TOPIC CHAIRMEN

Audio-Visual Techniques/8mm Professional Photography: NEAL KEEHN, General Film Laboratories, 1546 North Argyle Ave., Hollywood 28; Co-Chairman to be appointed.

Cinematography: WILLIAM D. HEDDEN, The Calvin Co., 1105 Truman Rd., Kansas City 6, Mo.

High-Speed Photography and Instrumentation: WILLIAM C. GRIFFIN, U. S. Naval Ordnance Test Station (Mailing address: Box 532, Ridgecrest, Calif.)

Integrated Visual Presentation Systems: ADRIAN TERLOUW, Eastman Kodak Co., 343 State St., Rochester, N.Y.

Laboratory Practice: GEORGE W. COLBURN, Geo. W. Colburn Laboratory, Inc., 164 N. Wacker Dr., Chicago 6.

Sound Reproduction: JOHN L. FORREST, Ansco, Binghamton, N.Y.

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Subscription TV, Panel Discussion: *Moderator,* T. GENTRY VEAL, Eastman Kodak Co., Research Laboratories, Kodak Park, Rochester 15, N.Y.

TV Equipment and Techniques: RICHARD S. O'BRIEN, Columbia Broadcasting System, Inc., 485 Madison Ave., New York 22.

TV Recording: NORMAN OLDING, Canadian Broadcasting Corp., P.O. Box 10, Snowdon, Montreal, Quebec.

The foundation is all laid for building the 90th Program by the above topics and chairmen — but a very important force not to be overlooked is the overall Papers Committee which works year in and year out regardless of where Conventions are held. Although the Committee has just been published as part of the Society's Administrative Committees in the April *Journal*, repeating and emphasizing their work is worth while:

General Chairman, *Robert C. Rheineck,* c/o CBS, 485 Madison Ave., New York 22

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C. Loren Graham (Chairman, Rochester; Program Chairman, 90th Convention), Eastman Kodak Co., Bldg. 65, Kodak Park, Rochester 15, N.Y.

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Western Hemisphere (except United States)

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CANADA: *Rodger J. Ross,* Canadian Broadcasting Corp., 354 Jarvis St., Toronto, Ont.

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GERMANY: *Adolf Kochs,* Wilhelm-Keim-Strasse 23, Munich

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ITALY: *Mario Calzini,* Tecnostampa Labs, Via Albalonga 38, Rome

THE NETHERLANDS: *W. J. M. Jansen,* N. V. Philips, Eksterlaan 5, Eindhoven

SWEDEN: *Osten Soderlund,* Hasselblads, Fotografiska AB, Motion Picture Dept., P. O. Box 428, Goteborg 1

SWITZERLAND: *Robert Suter,* Turicop SA, Regensbergstrasse 243, Zurich 11/50

USSR: *V. G. Komar,* Cinema Photo Research Inst., (NIKFI), Ministry of Culture of USSR, 47 Leningradsky Prospect, Moscow

Asia

INDIA: *H. Krishnan,* Kodak Ltd., P. O. Box No. 343, Kodak House, Dr. Dadabhai Naoroji Rd., Bombay 1

JAPAN: *Kiyohiko Shimasaki,* Motion Picture Engineering Society of Japan, Inc., Sankei-Kaikan Bldg. No. 3 Otemachi-1, Rm. 271, Chiyoda-ku, Tokyo

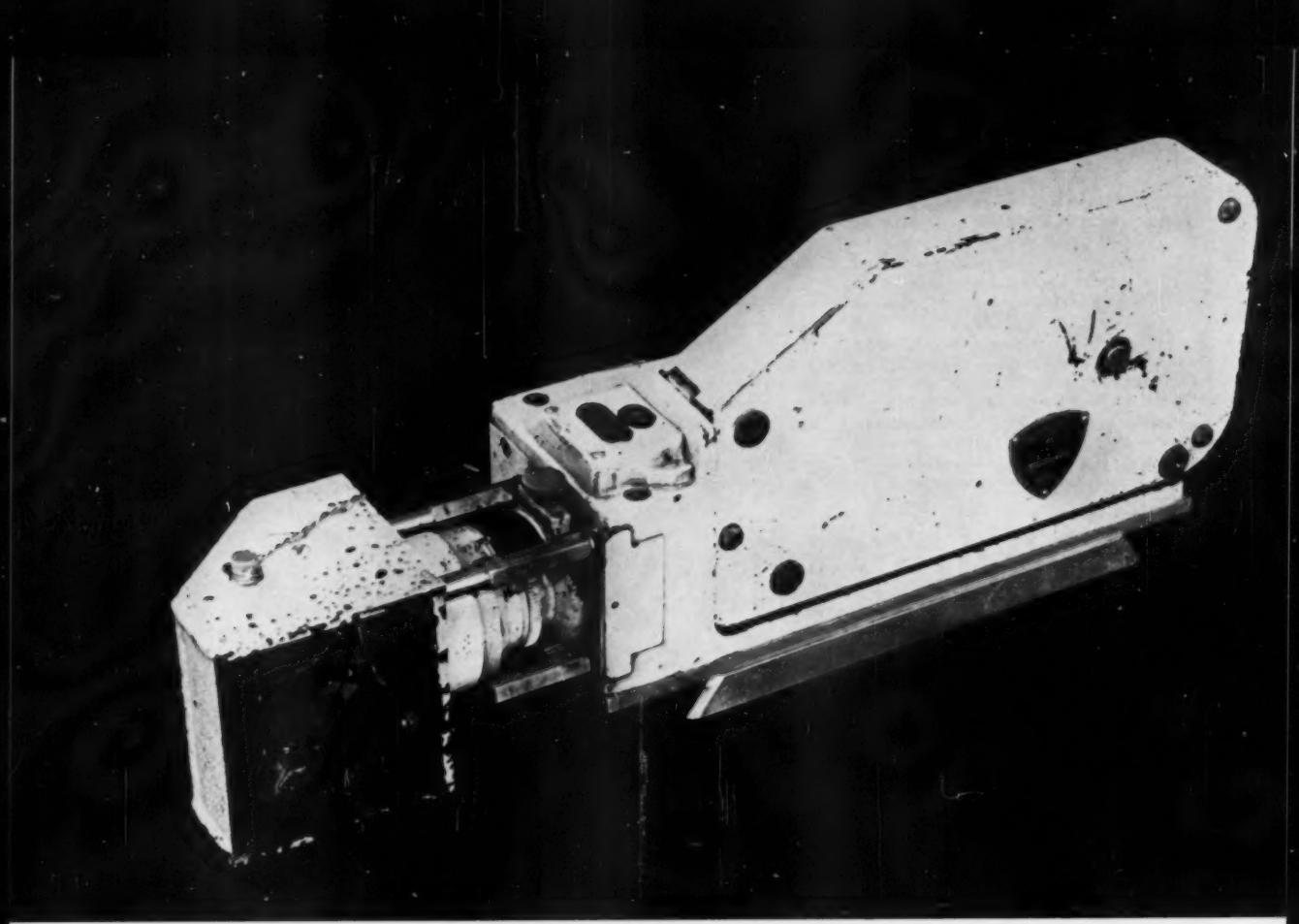
PHILIPPINES: *Juan D. Fornoles,* L.V.N. Pictures, Inc., P. O. Box 3610, Manila

Australasia

AUSTRALIA: *P. H. Budden,* Commonwealth Film Labs, 35 Missenden Rd., Camperdown, N.S.W.

NEW ZEALAND: *M. J. Ashley,* National Film Unit, Darlington Rd., Miramar, Wellington E. 4

Author Forms are available from any of the above Topic and Regional Chairmen. *Deadline* for Author Forms and the 50- to 75-word abstracts is July 17.



BEAUTY

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Whether gleaming white and showroom fresh, or showing the scars of hard usage, this camera represents a new breed of high-speed optical recorder. It combines the simplicity and dependability of continuous motion prism camera (it's loafing at 600 frames per second) with the sharpness and image-stopping quality of an intermittent camera.

Operating speeds of 12 to 1,000 frames per second. Film capacities of 100, 200, 400, or 1,200 feet. Let us show you one of these beauties tomorrow. *It's the BEST high-speed camera in the world!*

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Education, Industry News

SMPTE Student Member Award Competition for the academic year 1960–61 is now open and all student members of the Society are urged to participate. The purpose of the student competition is to recognize the outstanding paper presented by a student member of SMPTE.

To be eligible for competition a paper may be a thesis which has been accepted by the educational institution at which the student member is registered, or it may be prepared especially for the competition. It must deal with some technical phase of the Society's interests. In accordance with the Society's revised administrative practices, it is not necessary that a paper be presented at a Student Chapter Meeting before being entered in the competition. Each paper should be submitted in five copies to John L. Forrest, Chairman, SMPTE Journal Award Committee, c/o Ansco, Binghamton, N.Y., so as to reach him not later than July 1, 1961.

Winner of the Student Award will be announced at the Awards Session of the Society's Fall Convention which will be held at Lake Placid, N.Y., in October. The award shall be a suitable certificate and U.S. Government Savings Bond. If the winning paper has more than one author, certificates shall be presented to each, and the monetary award shall be divided equally between (or among) them. The paper will be published in the SMPTE *Journal*.

SMPTE Engineering Vice-President Deane R. White has been appointed a member-at-large of the National Academy of Sciences–National Research Council. The Society's Board of Governors nominated Dr. White following an invitation from the NRC.

Alex E. Alden has accepted an appointment to the post of Staff Engineer of the Society. He succeeds J. Howard Schumacher, Jr., who resigned in February to accept a position with the Electronics Industries Association (EIA). Mr. Alden, whose home is in Stamford, Conn., resigned from 20th Century-Fox Film Corp., where he was a research engineer, to accept the Society's appointment. His association with 20th Century-Fox dated back 15 years. As a research engineer, he worked closely with Earl Sponable, who is a Past-President and Honorary Member of the Society.

Mr. Alden has recently been engaged in the design and development of special optical and mechanical equipment for use in motion-picture studios and laboratories; he holds a number of patents in that field. His educational background includes work at the University of Southern California and New York University. During World War II he served in the Navy where he held the rank of Chief Petty Officer. His assignments included supervision of film laboratory and camera maintenance in the South Pacific Area.

The Industry Film Producers Association will hold its 2d Annual Convention June 2–3 at the Miramar Hotel, Santa Monica, Calif. Additional information including a brochure and program is available from Paul Garrison Organization, 10323 Santa Monica Blvd., Los Angeles 45.

Plans for expansion, including construction of a new studio, and new assignments within the organization have been announced by De Lane Lea Processes Ltd., 12 Moor St., London W. 1, England. Jacques De Lane Lea has been appointed Production Supervisor. This assignment includes responsibility for directorial activities. Overseas expansion plans and equipment research will be under the guidance of Major De Lane Lea. Louis Elman has been appointed Studio Manager of Studio A, located on Moor Street, and the new Studio B on Greek Street. Michael Carter has been appointed Technical Advisor to the Major. Ron Brown will be head of the Sound Department for both studios, and Paul Hansard, now in charge of Foreign Versions will also be in charge of the new 16mm and 8mm substandard department.

Encyclopaedia Britannica Films, Inc., 1150 Wilmette Ave., Wilmette, Ill., has recently expanded its production of educational films to include other types of programmed learning materials based on the findings of researchers studying the learning process, and constructed to con-

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form to the requirements of the specific course. For example, record and filmstrip programs are arranged for teaching modern languages at the elementary grade level; tapes are used for language laboratories; and programmed materials for mathematics. The films, tapes and other materials are designed to be supplemented by or used as a supplement to textbooks and exercise books.

Pictronics Corporation, 236 E. 46 St., New York, is a new audio-visual engineering and equipment center, established to maintain various services such as consultation, rental and sale of standard equipment, and fully equipped facilities for altering or modifying equipment to fit specific applications. The firm maintains operating displays of up-to-date equipment for audio-visual and motion-picture use. The displays include equipment for closed-circuit TV; television film recording; professional sound recording; overhead projection; motion pictures; slides and filmstrips; language laboratory; and photoinstrumentation. An announcement of the firm's services gave special attention to professional sound recording and industrial motion-picture production. The announcement also stressed availability of consultation services for all users of audio-visual and motion-picture equipment, such as educators, medical photographers, training directors, sales managers, promotional directors, sound recording engineers, and others in industry and business.

Factors to be Considered When Installing Emergency Generators, by Leonard Freemen, appeared in the December 1960 issue of **Public Works** and has been reprinted as a 4-page folder. It is available without charge from Onan Division of Studebaker-Packer Corp., 2515 University Ave. S.E., Minneapolis 14, Minn. Intended as a guide to point out some of the more common problems that may arise in standby installations, the article emphasizes the importance of reliability in an engine-generator set.

Allen B. DuMont has been named Honorary Member of the American Institute of Electrical Engineers, the highest recognition accorded by the AIEE. He is the 48th person to be so honored since the Institute was founded in 1884. He will be presented with a Certificate of Honorary Membership on June 19, during the opening session of the Summer General Meeting of AIEE at Cornell University. Dr. DuMont is the founder of the Allen B. DuMont Laboratories, Inc., now merged with Fairchild Camera and Instrument Corp. A graduate of Rensselaer Polytechnic Institute, he was elected Vice-President of the Board in 1960. Noted for many contributions in the fields of television and electronics, one of his important projects was the industrial development of the cathode-ray tube. Later he manufactured the first commercial oscilloscopes. Among his many awards and honors have been honorary degrees from Rensselaer, Brooklyn Polytechnic Institute, Fairleigh Dickinson University, New York University and Montclair State College.

Two newly promoted Vice-Presidents of Benson-Lehner Corp., Santa Monica, Calif., are Guy H. Hearon, Photo Instruments Division, and Walter E. Brown, Field Services Engineering. Mr. Hearon has been with the firm since 1956 and Mr. Brown joined the staff in 1954.

Sidney A. Lippin has been appointed Vice-President of L. B. Russell Chemicals, 14-33 31st Ave., Long Island City 6, N.Y. Mr. Lippin has worked in the photographic industry for 25 years and has been with L. B. Russell since 1958 as Plant Manager. The firm manufactures photographic, x-ray and graphic arts chemicals for commercial use.

The transmitter for Canadian Broadcasting Corp.'s new station, CBXT-TV, Edmonton, scheduled to go on the air September 1, 1961, is being built and installed by RCA Victor, Ltd., Canadian subsidiary of the Radio Corp. of America. Described as the most powerful low-band TV transmitter in North America, the new transmitter uses a specially designed super-grain antenna to achieve an effective radiated power of 318 kw. (The signal power of low-band transmitters is limited by international agreement to 100 kw within 250 miles of the Canadian-United States border; Edmonton is outside the specified geographical limits and not affected by the agreement.

The powerful transmitter is expected to extend TV reception to outlying farm areas.

Thirteen closed-circuit camera channels and associated equipment installed by Marconi Wireless Telegraph Co., Ltd., are used at the Standard-Triumph Motor Co., Coventry, England, as part of the procedure of inspection of new car bodies. The cars are carried automatically on conveyer belts from the manufacturing area to the inspection area. Monitors in a central control room are used to "track" the cars from one point to another to prevent delays, bottlenecks, and other mishaps.

TNT-Colorvision, a large-screen, closed-circuit color TV system linking 50 major markets within the United States, has been announced by TNT-Theatre Network Television, Inc., 575 Madison Ave., New York 17. The system is based on the Norelco Large Screen Compatible Color Television Projector, manufactured by Philips-of-the-Netherlands and supplied to TNT by North American Philips Co. The projector is said to be capable of projecting color images of 200 sq ft. The projector utilizes three Schmidt optical barrels containing 5-in. projector tubes with red, green and blue phosphors, respectively. The projector may be operated by remote control. Big-screen color was predicted (or perhaps hinted at) by TNT President, Nathan L. Halpern, in a paper published in the June 1957 issue of the **Journal,** pp. 378, 380, "Closed-Circuit TV Communications Progress." In describing the black-and-white closed-circuit TV as a communications medium, he said, "True big-screen color represents the next great technical and business advance in the closed-circuit medium."

The name of Cinematograph Export Ltd., 715 North Circular Rd., London N.W.2, England, has been restyled to Vinten Overseas Ltd. There has been no change in offices or personnel and cable and telegraph addresses have not been changed. The firm is associated with W. Vinten Ltd. and is responsible for sales of cameras and equipments outside Great Britain.

A color TV program was presented live of the ceremonies marking the opening of the new headquarters of the London Daily Mirror and Sunday Pictorial. The broadcast in color was over closed-circuit television to audiences in the building. The program was recorded on video tape for subsequent showings in black-and-white. Two color cameras and other equipment were supplied by Marconi Wireless Telegraph Co., Ltd. Marconi's also installed a closed-circuit TV system for document viewing which provides a visual link between the new executive headquarters in Holborn and the offices of Fleetway publications, located about a quarter of a mile away.

SMPTE Lapel Pins. Gold and blue enamel reproductions of the Society symbol, with screw back. Available to all members from Society headquarters. Price $4.00 incl. Fed. Tax; in New York City, add 3% sales tax.

Birth of a notion

The year is 1926. Late November. The setting, a broken down hut, disreputable discard of the first war. Outside, the thick fog blanketing the constant murmur of a hustling river, with its ambience of fussing tugs and ferry boat's sirens, is punctuated by the imperative overtones of the ocean-bound liners, demanding right of way.

Inside the hut the shaky walls are framed with benches loaded with a heterogeneous litter of cable, coils, radio parts, tools; a morse-key, a drawing board, a slide rule, a tray with the corpses of a sandwich and an egg; an atmosphere redolent of hunger, desperation, creative madness and defiance—all this a futuristic backcloth to the centre stage—an oversize kitchen table labouring under the weight of a Creed telegraph printer in various stages of dissection, a weary and ancient Bioscope projector head, driven by a motor whose enthusiasm waxes and wanes from a whine to a groan but which, nevertheless, persists in throwing the elusive shadow of gigantic lips mouthing a silent phrase, onto a cardboard screen.

The only actor on the stage, crouched over the mechanical bric-a-brac, spits out a curse with acid intensity. The paper tape of the Creed telegraph has broken again!

Any six-year-old child should solve this problem.

Any adult motion picture executive should realise that with the coming of Doc de Forest's Phonofilm, Fox's aeon tube, Photophone's galvanometer, Western's light valve, Svenson's steel wire—an afterbirth of Poulson's baby—the day of the caption "Came the dawn" is over. The once easy overseas distribution of any film will no longer be a simple matter of translating and replacing the silent caption "My God—you have stopped loving me" with "Mon dieu—tu ne m'aimes plus." No fear. These shadow faces will emit live sounds; words which added together will make articulate sense. It must be possible to make these odd characters talk French, or German, or Russian, or Chinese, or, or, or . . .

The problem stems from the fact that the motion picture artist finds it difficult enough to talk intelligibly even in his own language.

The Creed paper tape is repaired; the film loop starts again, is wound round to the first labial movement, and stopped. On the paper tape, the engineer writes "Be." The film is wound down to the next labial, and again is written on the tape a second "Be." The loop continues to turn, so does the paper tape; so does a loop of steel wire on an old souped-up Poulson-Stille Telegraphone. The spaces on the paper tape are filled in as each frame of picture is projected.

As the ocean-bound "Mauritania" blasts out a final insult, Bioscope, Creed, and Telegraphone, all synchronised with a Heath Robinson coupling, start to turn. The man yells out—"To be or not to be" . . . and it was.

It was the birth of the De Lane Lea Process for Post-synchronisation.

Unfortunately for the archives of motion picture history the Creed telegraph was lost; the Bioscope was sold; the Telegraphone disintegrated; the hut blew down; but the fruits of this humble birth were seen over a closed-circuit television monitor at the De Lane Lea stand during the recent T.V. Mail Awards Exhibition.

section reports

The Atlanta Section met on March 14 at Eastman Kodak Processing Laboratory in Chamblee, Ga., with an attendance of 43.

The meeting was prefaced by an announcement of the 89th Semi-annual SMPTE Convention and Equipment Exhibit. Following the announcement, an eight-minute color-slide talk was presented by Wesley R. Sandell, Chairman of the Atlanta Section. Mr. Sandell's discussion described the SMPTE book, "Color Techniques in Film Processing."

Guest speaker Allan Sorem of Eastman Kodak Research Laboratories, Rochester, N.Y., gave a very interesting talk entitled, "The Potential Role of Photography in Outer Space," in which he outlined some of the photographic problems peculiar to aerial photography which are especially important in designing systems to record fine detail, in small scale, of the ground at high altitudes.

To illustrate the progress that has been achieved in aerial photography, several slides were shown of pictures taken from kites, balloons, and even carrier pigeons, in man's earlier attempts to photograph the earth from increasingly higher altitudes.—John C. Horne, *Secretary-Treasurer*, 404 Page Ave., N.E., Atlanta, Ga.

The Boston Section met on February 9 at the Studios of WBZ-TV with an attendance of 29. Guest speakers were Raymond G. Hennessey of Fairchild Camera & Instrument Corp. and Thomas Hope of Eastman Kodak Co.

Both Messrs. Hope and Hennessey discussed the background of the 8mm sound field. Following their formal presentations, the speakers were joined by Charles Wyckoff of Edgerton, Germeshausen & Grier, Inc., for a question-and-answer period. The 8mm sound equipment of both Fairchild and Kodak were available for the audience to examine.

The meeting was extremely interesting and well presented. The audience, though small, was very active. Unfortunately, the Boston area had experienced its worst snow storm in many years the day before the meeting which made driving and parking conditions most difficult. The Boston Section is indebted to the two speakers for appearing despite the bad weather conditions and resulting transportation delays.

Mssrs. Hope and Hennessey were guests of the Boston Section at dinner prior to the meeting.—Lester Bernd, *Secretary-Treasurer*, Information Technology Labs., 10 Maguire Rd., Lexington, Mass.

Rodger J. Ross of the Canadian Broadcasting Corporation was guest speaker at a meeting of the **Boston Section** on March 8. His subject was "Exposure Control in TV Film Recording."

Mr. Ross presented an interesting and educational discussion, very adeptly applying the same theory to both TV recording and direct photography, thereby capturing the interests of both motion-picture cameramen and TV personnel.

Once again the Section was plagued by inclement weather, with extreme ice and snow conditions developing late in the afternoon, and reducing the attendance rate.

Mr. Ross was the guest of the Boston Section at dinner prior to the meeting.—Lester E. Bernd, *Secretary-Treasurer*, Information Technology Labs., 10 Maguire Rd., Lexington, Mass.

The Canadian Section met on January 26th at Cinesound, Ltd., in Toronto, with an attendance of 42. Guest speakers were Ivor Lomas of Crawley Films, Ltd., who discussed "Technical Problems of a 39-Week TV Series," and F. R. Crawley of Crawley Films, Ltd., whose subject was "Organization, Management and Selling of a Major Production."

The theme of the evening's program was established by the opening film which was one of the half-hour "R.C.M.P." series produced for television by Crawley Films, Ltd., Ottawa.

Mr. Lomas discussed and illustrated some of the many control problems associated with the endeavor, ranging from high-contrast snow scenes to static caused by low winter humidity.

Canadian Kodak hosted the social period that followed Mr. Lomas' presentation. Coffee and doughnuts were served in the Cinesound cafeteria.

A highly informative and entertaining address by Mr. Crawley completed the program. The speaker pointed out that a Canadian production of this magnitude must be presold to a certain extent in Canadian, British and U. S. markets to

be economically feasible. He also was firm in the belief that lessons now learned would permit a substantial cost saving on future series of this type, without reducing production quality.

Audience response to both speakers confirmed the evening as a highlight of the winter program.

A pre-meeting dinner with the speakers was enjoyed before the open fireplace at Les Cavaliers Restaurant.—R. B. Mackenzie, *Program Chairman*, c/o Mackenzie Equipment Co., 433 Jarvis St., Toronto.

The Canadian Section met on March 29 at Meridian Films Ltd. in Toronto with an attendance of 40. Guest speakers were J. L. Bateman of Canadian Broadcasting Corp., who discussed "TV Special Events," and F. T. Stinson of Adfilms Ltd., whose subject was the "1960 Venice International Advertising Film Festival Winners."

Live TV coverage of a fleet review from a warship on Lake Ontario, to Royal Tour pictures of Queen Elizabeth II from a moving car in Ottawa, were only two of the interesting assignments described by Mr. Bateman, who used slides to illustrate how CBC remote-broadcast crews arrange for lighting, microphone, camera and microwave equipment in diverse locations.

Following Mr. Bateman's presentation, there was a brief intermission during which coffee and doughnuts were served through the courtesy of Bell & Howell Canada Ltd.

Mr. Stinson's discussion included in his 30-min film excellent examples of commercials produced in many European countries, plus several from the United Kingdom, one from Israel and two from the United States. Interest in these examples was very keen since, in general, the production techniques and end results were quite different from the usual North American television or theatrical commercial. Most of the films featured a "soft sell" approach, which hurtled the language barrier with extensive use of unusual sight and sound impact and a minimum of human voice.

Prior to the meeting, the speakers met with members of the Section for dinner at the new Four Seasons Hotel.—R. B. Mackenzie, *Program Chairman*, c/o Mackenzie Equipment Co., 433 Jarvis St., Toronto.

The Chicago Section met on February 28 at the Prudential Building with an attendance of 50. Fred Emens, Manager, Fastax Division of Wollensak Optical Co., was the guest speaker. His subject was "Applications and Techniques of High-Speed Photography."

Following a coffee break, Mr. Emens delivered a second paper which described the equipment necessary for taking high-speed pictures. In connection with this paper, several examples of high-speed equipment were demonstrated and a number of high-speed film samples were shown.

Earlier in the evening, a meeting of the Chicago Section Board of Managers was held, followed by dinner.—Philip E. Smith, *Secretary-Treasurer*, Kodak Processing Lab., 1712 Prairie Ave., Chicago.

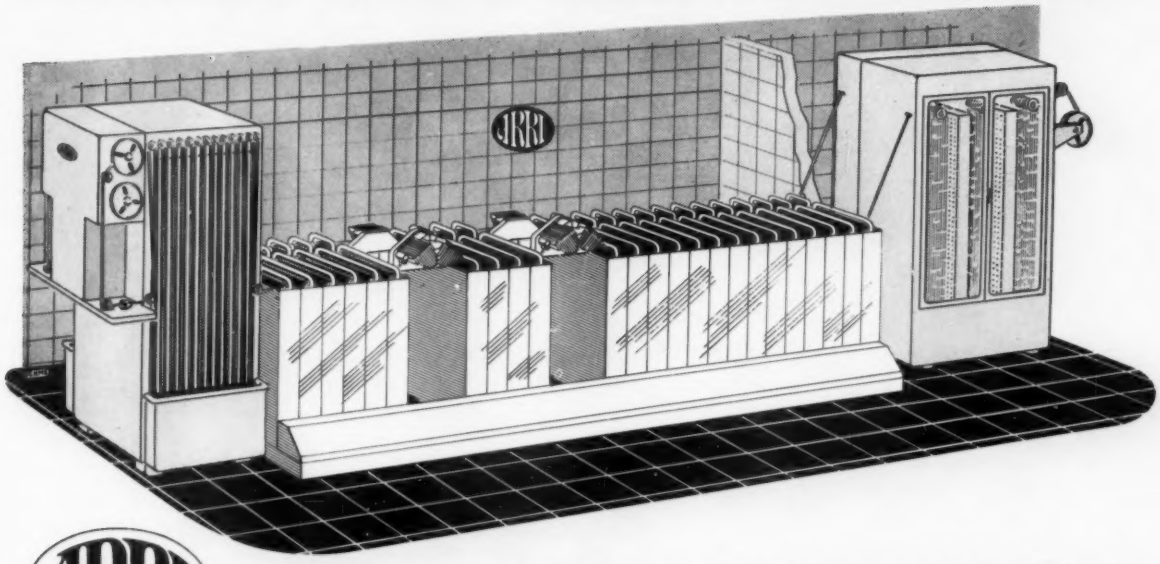
A meeting of the **Chicago Section** was held in conjunction with the Behrend Sound Symposium on March 30 at the St. Clair Hotel. The meeting, which was attended by 100 persons, was opened with the showing of a motion-picture short entitled *Movie Fantasy*, produced by the Canadian National Film Board.

The first paper was given by Ralph Sogge, Director of Customer Services, Magnasync Corp., on the subject of "Recorder Curves and Head Characteristics." Mr. Sogge explained the nature of frequency response from recording heads and the expected characteristic curves of magnetic recording and playback heads. Slides were shown which illustrated head construction, various characteristic curves, and the effects of head wear, signal-to-noise ratio and bias measurements as an indication of possible distortion.

Dr. Hans Wohlrab of Bell & Howell Co. showed a number of examples of variable area and density soundtracks.

A final paper was delivered by Art Cunningham, Chief Sound Development Engineer for the George W. Colburn Laboratory on "Optical Track Analysis." Mr. Cunningham explained the methods of production of optical tracks and their limitations. He illustrated the effects of various circuits, and the optimum positive and negative track densities. Mention was made of difficulties in processing and the effect of projection conditions.

GOING INTO KODACHROME?



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The meeting was closed following the serving of coffee.—Philip E. Smith, *Secretary-Treasurer*, Kodak Processing Lab., 1712 Prairie Ave., Chicago.

The Dallas-Fort Worth Section met on March 28 at the Kodak Processing Laboratory in Dallas with an attendance of 51. Guest speakers were M. D. McCarty of Socony Mobile Oil Co. and E. J. Pattist of Eastman Kodak Co.

Mr. McCarty reviewed several papers and reports on new uses of 8mm film, and discussed the quality of sound reproduction via magnetic striping on 8mm film.

Mr. Pattist gave a nontechnical talk on Kodachrome Type II Film. Samples of regular and Type II Kodachrome film were projected. His talk was followed by a coffee period and a tour of the Kodachrome and Kodak Ektachrome processing facilities of the Kodak Processing Lab. —Richard T. Blair, *Secretary-Treasurer*, 1924 Hillburn Dr., Dallas.

The Hollywood Section met on February 21 at Paramount Studios with an attendance of 600. Guest speakers were Y. Frank Freeman, Paramount Pictures; Jerry Lewis, Actor-Producer; Bruce Denny, Paramount Sound Studio; and W. Wallace Kelley, A.S.C.

Mr. Freeman opened the meeting with remarks relative to the increasing competition in the motion picture industry and through this the development of new techniques and more efficient production methods.

Mr. Lewis gave an extremely interesting review of the problems encountered on the unusual set design of his production *Ladies Man*. This covered the various phases involved, such as photography, lighting, sound, etc. At the conclusion of Mr. Lewis' discourse, Mr. Denny placed himself at the disposal of those at the meeting who wished to see demonstrations of the methods utilized for multiple microphone placement, mixing and closed-circuit television camera direction used to satisfy Mr. Lewis' unique requirements for sound recording.—John Kiel, *Secretary-Treasurer*, c/o Producers Service Co., 820 South Mariposa St., Burbank, Calif.

At a combined meeting of the **Hollywood Section** and the Audio Engineering Society on March 21, the guest speaker was Karl Linnes, Research Group Supervisor, Advanced Project Group, Jet Propulsion Laboratory. Two hundred twenty persons attended the meeting at the University of Southern California.

In his discussion of "Applications and Limitations of Deep Space TV," Mr. Linnes covered what has already been accomplished and what is currently being attempted in this field. He talked about certain special problems of television equipment mounted in space aircraft, including size and weight limitations, as well as environmental conditions to which such a system is subjected. Additionally, he gave a unique comparison of the requirements of deep space television to that of standard telecasting equipment.

An interesting feature of the meeting was the presentation of a motion picture describing the activity of the Jet Propulsion Lab in the "Echo" project.—John Kiel, *Secretary-Treasurer*, Photo-Sonics, Inc., 820 South Mariposa St., Burbank, Calif.

The Hollywood Section met on April 18 at the 20th Century-Fox Studio Lot in Beverly Hills with an attendance of 307. Guest speakers and their subjects were: Gordon Sawyer, Samuel Goldwyn Studios, "Selection of Outstanding Achievements by the Academy Technical and Scientific Awards Committee;" Carl Hague, Consolidated Film Labs., "Automatic Developer Replenisher System;" William L. Widmayer, Columbia Pictures, "Application of a Flicker Indicating Device;" Petro Vlahos, Systems Development Corp., "Technical Aspects of a Flicker Indicating Device;" Arthur Holcomb, Valley-Maico Hearing Service, "Early Development of a Flicker Indicating Device;" and Frank O'Connor, 20th Century-Fox Corp., "Miniature Flak Gun and Ammunition."

De J. White of Magnasync Corp., introduced the speakers.

The subjects were presented in an interesting manner. Mr. O'Connor, key effects man for 20th Century-Fox's Mechanical Effects Dept., demonstrated the miniature flak gun. He has been associated with 20th Century for twenty-five years.

The Academy Award cartoon *Munro* was not shown because representatives of Rembrandt Films of New York did not have a print with them. However, the runner-up, *High Note*, by Warner Bros., was shown and very well received.

A pre-meeting dinner, held at Beefeaters Restaurant was attended by sixty-one persons.—John Kiel, *Secretary-Treasurer*, Photo-Sonics, Inc., 820 South Mariposa St., Burbank, Calif.

The Nashville Section met on March 18 at the Studio of the Tennessee Game and Fish Commission with an attendance of 23. Guest speaker was Bill Hedden, Vice-President of the Calvin Co., Kansas City, Missouri.

Mr. Hedden discussed color film stocks, both original and print materials, and the various methods of making release prints. Demonstration prints were run, showing both reversal and positive release prints, and also showing examples of correction of exposure and color balance on a "before and after" basis. A reel of the newly announced Type 2 Kodachrome was demonstrated as well as some 8mm reduction prints from both the old and new materials. The speaker invited questions and discussions during his program.

Coffee and doughnuts were served through the courtesy of the Tennessee Game and Fish Commission, following Mr. Hedden's presentation.

A film record of the SMPTE Los Angeles Convention held last spring was shown to the group. The film was prepared by three members of the Section who attended the meeting.

At the close of the meeting those attending had the opportunity to examine specimens of Tennessee wildlife kept outside the studio. These animals are used as "actors" in some of the films prepared by the Commission.—H. R. Briscoe, Jr..

Secretary-Treasurer, 403 Signal View, Chattanooga, Tenn.

The New York Section met on March 8 at the World Affairs Center Auditorium with an attendance of 36. M. H. Mesner of the Astro-Electronics Division, Radio Corporation of America, was the guest speaker. His subject was "Space Borne TV Cameras."

Mr. Mesner described the TIROS Satellite (Television and Infrared Observation Satellite) and presented a half-scale model which was examined by the members. His paper consisted of a description of the unit and the problems encountered during the designing stages. It was necessary to ascertain how mechanical, optical and electronic equipment would operate in vacuum. Specifically, they were concerned with effects of radiation, lubrication and sublimation, as well as the boiling and leakage of liquids in some electrical components. Electrical insulators were also of concern. The reliability of control and power equipment was of major interest. Mr. Mesner mentioned that the scanning frame rate was reduced from 1/30 sec to 2 sec, which reduces the bandwidth but allows for power reduction.

A $1\frac{1}{2}$-millisecond shutter reduced image "smear" which was due to the rotation of the satellite.

Mr. Mesner's talk was extremely well documented by black-and-white and color slides taken from TIROS depicting meteorological data gathered around the world.—William H. Metzger, *Secretary-Treasurer*, c/o Ansco, 405 Lexington Ave., New York.

The New York Section met on April 12 at the World Affairs Center Auditorium with an attendance of 65. Guest speaker was Hubert J. Schlafly, Vice-President, TelePrompTer Corp. His subject was "Random Access to Audio-Visual Information."

Mr. Schlafly described and demonstrated a series of slide projectors and a magnetic-tape playback unit which was designed for group communication. The three slide projectors designated RA 60, RA 100 and RA 500 accommodated 60 $3\frac{1}{4} \times 4\frac{1}{4}$, 100 2×2 and 500 2×2 slides respectively. The magnetic-tape playback unit was capable of programming 100 separate tracks.

Remote control which permitted random access to any slide or track was accomplished via a digital selector control and motor module which fit in the hand of the operator; hence, the designation RA. By setting the digital counter and pressing the activating button any slide could be called up immediately. In the case of the RA 500 no more than 8.1 sec was required to call up any slide.

The motor module is based on the Wheatstone Bridge principle plus a series of relays. The units display an accuracy of one part in 10,000.

In the case of the projectors, slides are arranged in drums positioned horizontally. The RA 500 consists of five drums, each containing 100 slides in stacked arrangement.

Mr. Schlafly pointed out that it is possible to have the same Wheatstone Bridge activate a slide projector and tape playback unit simultaneously so as to produce sound and picture synchronously.

Ideal use can be made of the above equipment by military installations, educational institutions, sales groups and various other organizations. A vast amount of information can be programmed prior to use, and random access to any and all of it is possible at the touch of a button.—William H. Metzger, *Secretary-Treasurer*, Ansco, 405 Lexington Ave., New York.

Sixty-eight members of the **Rochester Section** gathered at the Informational Films Service Studios of the Eastman Kodak Company for a trip through a typical 16mm commercial film production plant.

The members were welcomed by E. B. Hall, Manager of Informational Films Service, who explained the purpose of such a unit in the Eastman Kodak Company.

John Mills Jr. took the group through the various stages of script preparation, staging, lighting, and shooting of the films. His presentation was given from the writer-producer's view.

A. L. Reber conducted the members through the sound recording facilities, explaining equalization (dialogue), re-recording techniques, etc., and at the conclusion recapped the entire presentation.

Many questions were asked relative to the construction of the plant and its fa-

cilities. The evening was concluded with coffee and doughnuts. All members present expressed their appreciation for this informative meeting.—D. L. Conway, *Secretary-Treasurer*, Maple Hill Farm, R.D.2, West Monroe, N.Y.

The Rochester Section, meeting at the Dryden Theatre on March 30 with an attendance of 31, was given a rare treat in the unusual and very interesting presentation of "The Motion Picture as a Tool in Medical Communication," by Warren Sturgis, President of Sturgis-Grant Productions, Inc., New York City.

Mr. Sturgis traced the history of early medical films and the aversion of medical colleges to the use of them as teaching aids. Their "premium on dullness" and lack of dramatic values, coupled with traditional professors who saw no use in them, resulted in a slow adoption of their use, he pointed out.

Today, however, the speaker observed that they are being widely used by the medical profession for purposes of research, records, demonstration for teaching, clinical, orientation, motivation, and (by pharmaceutical houses) commerce.

Mr. Sturgis demonstrated the various types of films now in use with selected cuts from commercial productions. These were accompanied by explanations covering the reasons for, and the making of, the various types of films from which they were taken.

The speaker's thorough coverage of his subject included present day necessary qualifications for those thinking of entering this phase of motion-picture production, pricing, customer, and audience approach, etc.

The program is highly recommended to other SMPTE Sections as an interesting and unusual presentation.—D. Lisle Conway, *Secretary-Treasurer*, Maple Hill Farm, R.D. 2, West Monroe, N.Y.

The San Francisco Section met on February 13 for a combination dinner-lecture meeting dealing with the history of the Mt. Sutro transmitter site. Guest speaker was Harry Jacobs, Chief Engineer, KGO-TV, San Francisco.

The speaker discussed the Mt. Sutro location. The original problems involved in the purchase of the six-acre section of land, which is approximately in the center of San Francisco; the problems encountered in converting the old Sutro mansion and the erection of a 500-ft tower were illustrated by a 16mm film.

After Mr. Jacob's talk the meeting moved to the transmitter site which is now the home of KGO-TV, KPIX, KBAY-FM and KECO-FM. Tom Ely, Chief Engineer for KPIX, acted as co-host at the site and conducted our tour of the KPIX installation.—Clifton R. Skinner, *Secretary-Treasurer*, c/o Skinner, Hirsch & Kaye, 336 Funston Ave., San Francisco.

On March 14, fifteen members of the **San Francisco Section** met at Schroeder's Cafe for dinner. Later, the group met at W. A. Palmer Co., where other members joined it bringing the total to 36.

An extremely interesting talk was given by Stewart A. Macondray of the W. A. Palmer Co. Mr. Macondray explained the problems of developing machines in general, and described Palmer's new Hills black-and-white reversal machine, explaining the unusual features such as: (1) high temperature of all solutions; (2) continuous replenishing of all solutions; (3) high output for its small amount of solution; and (4) unusual threading.

Following Mr. Macondray's talk, the group moved to the color processing laboratory of Barry Brose. Mr. Brose explained in detail the differences in their elaborate color machines. Also, he discussed developing machines. A question-and-answer period was held after the formal presentation.

In spite of heavy rain, those who attended this meeting seemed very pleased with the discussions.—Clifton R. Skinner, *Secretary-Treasurer*, Skinner, Hirsch & Kaye, 336 Funston Ave., San Francisco.

About 150 members and guests attended the February 9 meeting of the **Washington Section** at the Academia of the Motion Picture Association of America. Continuing the Section's theme, "Communications—How Can Our Efforts Be Better?," the program consisted of a business meeting and premiere showings of two motion pictures.

The first of these motion pictures, "Brass and Percussion Instruments," featured some of the finest brass and percussion instrument recording ever put on a soundtrack. It was sponsored by the Society of Artist Musicians of Brass and Percussion as a demonstration piece to be used for instruction purposes in music clinics and workshops. It was filmed and recorded in Norwood Studios with prints made by Capital Film Laboratories, both of which are very active in Section affairs.

Captain Dale Harpham, Assistant Director, U.S. Marine Band, who conducted the musicians in the motion picture and Bramwell Smith, the featured trumpet and postillion horn soloist were at the meeting and were introduced to the group. Captain Harpham was instrumental in furnishing the Marine Corps musicians which made the October meeting such a success. Both gentlemen discussed the purpose, production and distribution details of the motion picture with the members and guests present.

The second motion picture shown was Paramount's delightful, sophisticated production featuring Shirley McLaine and Dean Martin.

Refreshments were served following the screenings. The Section's thanks were extended to Robert Crisp of the Motion Picture Association, for his fine work on arrangements.—David E. Strom, *Secretary-Treasurer*, 1002 By-Pass Rd., Williamsburg, Va.

The Washington Section met on March 24 at the New Department of State Auditorium with an attendance of 50. Guest speakers were Charles B. Shinkwin, Chief of Division of Buildings Management, Department of State; and Anthony Guarco, Deputy Director, Motion Picture Service, United States Information Agency.

Mr. Shinkwin discussed "Design and Utilization of the Auditorium and In-

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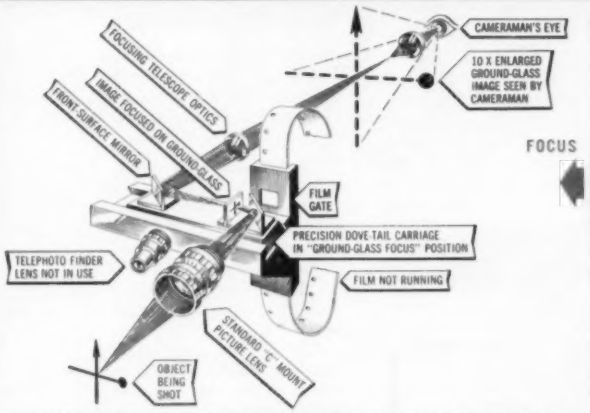

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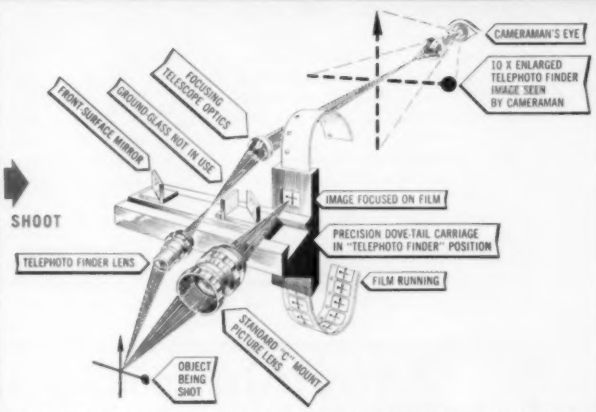

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ternational Conference Facilities." Mr. Guarco's subject was "Award Winning USIA Pictures."

The meeting was opened with the showing of a motion picture of President Kennedy's press conference of the previous evening, which was held in the room in which the Section meeting was taking place.

In his talk, Mr. Shinkwin pointed out the unusual features of the State Department Auditorium, among which are its use as part of the Department's International Conference facilities. Not only can the auditorium accommodate press conferences, but it also has an unusual complement of audio and video facilities including those for simultaneous translation, for motion-picture and still photography and still picture projection. These facilities were demonstrated and Mr. Shinkwin took the group on a personally conducted tour of the projection room and the main international conference room.

The projection room is equipped with remote lighting control, arc slide projector, Eastman Model 25 16mm Arc Projector, and a new version of the DeVry 35mm Projector manufactured by Paromel Electronics, Inc. These feature preview attachments and will run either forward or reverse.

Mr. Shinkwin won many friends because of his thoughtfulness and interest in responding to questions and demonstrating facilities. A special word of thanks is due G. H. Sorenson for his assistance with this part of the meeting.

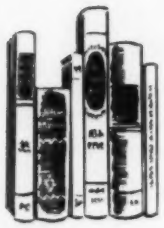
The second part of the meeting began at 8:00 p.m. when the Section joined members of the Washington Film Council for a showing of six award-winning USIA motion pictures. These films were shown on the same equipment that had just been explained and demonstrated by Mr. Shinkwin. Turner B. Shelton, Director of the Motion Picture Service of the USIA, extended the invitation to the Washington Section to attend this showing.

Jack Evans, Special Assistant to Mr. Shelton, introduced Chairman Youngs, the Washington Section Board of Managers and the officers of the Washington Film Council, following the showing. He then presented Mr. Guarco, who gave the background and explained the role of these films in interpreting the United States abroad.

Both domestic and foreign productions were shown. The scope of subject matter and motion-picture techniques presented, gave the audience a clearer picture of the efforts of the Information Service. The significance of these productions was enhanced in the context of the fine new auditorium and its international atmosphere.

The opportunity to have these new facilities demonstrated to the Section may be attributed to the foresight of Chairman William E. Youngs, who is a member of the Board of Directors of the Washington Film Council. Mr. Young serves in an advisory capacity at the Auditorium.

An informal poll of the Section membership after the meeting indicated that it was very well received.—David E. Strom, *Secretary-Treasurer*, 1002 By-Pass Rd., Williamsburg, Va.



books reviewed

Kurzzeitphotographie: Bericht über den IV. Internationalen Kongress für Kurzzeitphotographie und Hochfrequenzkinematographie (Proceedings of the Fourth International Congress on High-Speed Photography)

Edited by H. Schardin and O. Helwich. Published (1959) by Verlag Dr. Othmar Helwich, Hoffmannstrasse 59, Darmstadt, Germany. 7 by 10 in., 340 pp., 600 illus. DM 92. 7/10/–. $22.00.

The Proceedings of the Fourth International Congress on High-Speed Photography have been published through the diligent editorship of Dr. Othmar Helwich of Darmstadt. The 340-page volume gives a high-quality presentation of the 65 papers of this symposium which was held at Cologne during the period 22–27 September, 1958.

Method of presentation is by the language of the original paper, with summaries in two other languages. Value to the English-speaking reader without personal proficiency or access to translation services for German and French may be measured by the fact that 23 of the papers are presented in English. Thus, when the factor of excellent reproductions of very fine examples of high-speed photographic recording in the foreign-language papers is added to the considerable numbers of papers appearing in English, it becomes evident that this volume will become a most useful addition to the library of high-speed photographers throughout the United States.

Theme of the volume is set by the initial invited paper by Professor Hubert Schardin describing the major early contributions to this field by Carl Cranz, a ballistician whose use of high-speed photography in the study of ballistics has left its mark on virtually every other field now employing this medium. It was especially appropriate that this review and tribute to Cranz should have been presented by his colleague, Schardin, whose own work has further developed and refined the efforts of Cranz.

Especially interesting work accompanied by outstanding illustrations included K. R. Coleman, whose presentation included a photograph of the shock heating of deuterium made by J. K. Wright; W. H. Allan and D. B. Clark on a pinhole camera for aeroballistic techniques; H. F. Edgerton on flashes of about 10 mμsec duration (work that was further reported on at the Fifth Congress and published in the March 1961 issue of the *SMPTE Journal*); D. P. C.

Thackeray with a thorough review of developments in the production and assessment of high-intensity discharges, with emphasis upon work accomplished during the two-year period between the Third and Fourth Congresses; G. G. Treshchev on studies of the surface boiling of water; and J. Vogel describing the photography of air flows by means of multiple spark paths, a most interesting and graphic technique.

While the volume reports work that was accomplished three or more years ago, it will be of major usefulness to all serious workers in the field. With publication of the proceedings of the Fifth Congress expected during 1961, the four formal volumes of Congress proceedings and the seven volumes of SMPTE reprint volumes in high-speed photography and photographic instrumentation add up to a rich source of information that should be at hand in every establishment using this medium of observation and measurement of fast events.—*Carlos H. Elmer*, 410B Forrestal St., China Lake, Calif.

The American Cinematographer Manual

Compiled and edited by Joseph V. Mascelli. Associate Editors: Arthur Miller and Walter Strenge. Published (1960) by The American Cinematographer Manual, P.O. Box 2230, Hollywood 28. 420 pp. incl. index, diagrams, tables, plus additional adv. pages. 4 by 7 in. Price $7.50.

This handy, pocket-size manual is densely packed with a wealth of information arranged with the utmost convenience for ready reference. Ten sections (Cameras, Films, Lenses, Exposure, Black & White Filters, Color, Lighting, Background Process, Television & Sound, Special Techniques) are thoroughly indexed so that data can be located without delay. Brief but explicit descriptions are given of equipments produced by a number of well-known manufacturers of photographic supplies, including various types of cameras and related equipment. Descriptions, exposure indexes, identification markings, incident light tables and other pertinent data for the various motion-picture films generally available in the United States are included.

Each section includes a set of Tables and 22 pages at the end of the book are devoted to formulas, conversion tables, electrical data, etc. The book also includes the List of Motion-Picture Technical Terms in Five Languages, initiated by Carlos Connio Santini, reprinted from the *SMPTE Journal*. This and other contributions by the Society are acknowledged in the Introduction to the *Manual*.

The Tables in the book are all integrated so that they may be used with each other. A shading system is used to make all normal data (24 frames/sec; 175° shutter; basic exposure without filter, etc.) and any data one step apart instantly apparent.

Interspersed with the tables and formulas are brief didactic essays and paragraphs and extremely practical helpful hints. An informative article on "Television Film Cinematography" was contributed by Edward P. Ancona, Jr., and the basics of high-speed photography are presented in a brief article by John H. Waddell. Other brief but authoritative articles cover the essentials of almost every aspect of cinematography.

Ten Books on Related Subjects

John F. Rider Publisher, Inc., 6 by 9 and 5¼ by 8¼ in., titles and other identification below.

No. 259: *Basic Ultrasonics* by Cyrus Glickstein, April 1960, 144 pp. Price $3.50 soft cover, $4.60 cloth cover.

No. 200-8: *Magnetic and Electrical Fundamentals, Franklian Approach*, by Alexander Efron, December 1959, 136 pp. Price $2.50, paper cover.

No. 166-26: *Advanced Magnetism and Electromagnetism*, edited by Alexander Schure, December 1959, 104 pp. Price $2.25, paper cover.

No. 166-20: *Magnetism and Electromagnetism*, edited by Alexander Schure, November 1959, 78 pp. Price $1.80, paper cover.

No. 166-27: *R-F Amplifiers*, edited by Alexander Schure, October 1959, 104 pp. Price $2.40, paper cover.

No. 166-30: *Low-Frequency Amplifiers*, edited by Alexander Schure, May 1959, 88 pp. Price $1.80, soft cover.

No. 166-28: *Video Amplifiers*, edited by Alexander Schure, February 1959, 88 pp. Price $1.80, soft cover.

No. 166-19: *A-C Circuit Analysis*, edited by Alexander Schure, December 1958, 104 pp. Price $1.80, soft cover.

No. 166-22: *Vacuum Tube Characteristics*, edited by Alexander Schure, December 1958, 96 pp. Price $1.80, soft cover.

No. 166-24: *Gas Tubes*, edited by Alexander Schure, October 1958, 80 pp. Price $1.50, soft cover.

The publisher's mailing pieces carry the stamped legend, "Publishers of the fabulous picture book course in basic television." The pictures do, indeed, prove to be one of the most prominent features of these books. Your reviewer, therefore, chose to start his review by studying the pictures.

It may be unfortunate that the *Ultrasonics* volume was the first selected, as the pictures in this book proved disappointing. With 120 pictures in less than 144 pages, the volume of picture material amounts to almost half of the entire book. All are line illustrations, of the style associated with military instruction books. However, a military illustration is generally chosen for its value in developing a point not readily apparent from text description, alone; while the illustrations in the volume being reviewed were judged to be of trivial value. Typical are pictures of a man cupping his hand to his ear, over a legend saying, "Ultrasonic vibrations are not audible" (⅛ page); bouncing a coin and striking a rail, over a legend, "Examples of nondestructive testing" (⅛ page); dipping a foot into a tub of liquid, over a legend, "Ultrasonic energy applied to immersed limb" (⅛ page), and so on. In fact, the illustrations in this volume seem to have been chosen to some extent, at least, for their value in ex-

panding the text. A 5-page article on the same subject, written by Robert L. Rod of the same company as the author, appeared in Radio and TV News, February 1959, and covered almost as much material as the 144-page book.

Illustrations in the other volumes of the group reviewed were found to be of greater value, and smaller in number. In other respects, as well, these books were judged to be of much better quality than the one first reviewed. All of the books in this latter group were found to be practical, rigorously accurate, conservative in style, and very readable.

A common feature of these latter books is the use of mathematics to the extent necessary for proper presentation of the subject matter. The level is that of high school or early college.

The phrase "Franklinian Approach" which appears in one of the titles indicates that the text uses the older accepted convention regarding direction of current flow, that is, from plus to minus. The care shown in indentifying the approach is indicative of careful preparation throughout the text presentation.—*Bernard D. Plakun*, GPL Division—General Precision, Inc., Pleasantville, N.Y.

Classification of Electron Tubes

By J. Haantjes and H. Carter. Published (1960) by the Macmillan Company, 60 Fifth Ave., New York 11. Printed in the Netherlands. 100 pp. illus. and 2 tipped-in charts. 8 by 11¾ in. Price $3.50.

How to tell one "-ode" or "-tron" from another is the subject of this newly published book, as is apparent from the title. However, the title, alone, does not indicate the outstanding feature of the book, which is the color artwork of the illustrations.

The text is a serious, scholarly presentation. A brief and simple account of the principal features of electron tubes is given in the early part, and leads to a general statement of the classification methods used. More detailed statements are given in the subsequent divisions, which include: High-vacuum thermionic tubes of general purpose; X-ray and cathode-ray types; High-vacuum photoelectric devices; Gas-filled thermionic tubes; Cold-cathode tubes; Gas-filled photoelectric cells; and Pool cathode tubes. The text concludes with an index of applications, and an alphabetical glossary of tube types. The system used for classifying electron tubes is logical and well-defined, offering the possibility of a stable base for classification of future types in a rapidly expanding technology.

The value of the text is enhanced by strikingly beautiful artwork. Some 30 representative tube types are illustrated by full-page cutaway views, in full color, printed by a process which compels admiration. Other illustrations, generously used, are of the same high quality. The artists who prepared the illustrations have transformed a familiar utilitarian device into a vivid subject for modern art.—*Bernard D. Plakun*, GPL Division — General Precision Inc., Pleasantville, N.Y.

Singers' Glossary of Show Business Jargon

By Al Berkman. Published (1961) by Wilshire Book Co., 8721 Sunset Blvd., Hollywood 46. 96 pp. Illus. 8¾ by 5¼-in. Paperbound. Price $2.00.

Although a number of slang terms peculiar to show business are included in this book, the title is somewhat misleading in that the preponderance of terms defined cannot, in any sense of the word, be described as "jargon." For example (three randomly chosen out of many), "decible," "G clef," "larynx," are defined according to the dictionary and long-accepted usage. However, terms peculiar to show business — "silo circuit," "hot mike," "lay an egg" — are included in sufficient numbers to give some meaning to the title. This is really no ordinary glossary. For example, under "Instruments," 63 musical instruments used in various types of orchestras and "combos" are described and most of them are illustrated. Concise descriptions include a good deal of historical information as well as information on the construction and use of each instrument — some of them quite exotic. The familiar instruments of ancient and honorable lineage (the violin, cello, oboe, bassoon, etc.) are mixed up in some strange company, to wit, "jaw bone: The jaw bone of native two-year-old Cuban horses hand painted in various colors. When struck with the fist it produces a vibration peculiar to this instrument . . ." The book is well written and the illustrations selected with imagination and taste; a few cartoons interspersed with the photographs and diagrams are apt and witty. Except for the unfortunate title, this is a completely delightful book.

current literature

The Editors present for convenient reference a list of articles dealing with subjects cognate to motion-picture engineering published in a number of selected journals. Photostatic or microfilm copies of articles in magazines that are available may be obtained from The Library of Congress, Washington, D.C., or from the New York Public Library, New York, N.Y., at prevailing rates.

American Cinematographer vol. 41, Oct. 1960

Filter Lore (p. 609) *C. Loring*

vol. 41, Dec. 1960

An Infrared Self-Matting Process (p. 740) *Z. Vidor*

vol. 42, Feb. 1961

A Simple Sound Dubbing Method for Magnetic-Stripe Films (p. 101) *K. H. Barney*

vol. 42, Mar. 1961
Cold Storage Protects Color Negatives (p. 170) *W. Widmayer*

Bild und Ton vol. 13, Aug. 1960
Moderne Filmwiedergabeverfahren im modernen Filmtheater (p. 236) *G. Cepnik*

vol. 13, Oct. 1960
Die Synchronität beim 16-mm-Amateurtonfilm (p. 305) *H. Schoenecker*

vol. 13, Dec. 1960
Wir belauschen den Uhu und andere Gesichter der Nacht (p. 372) *U. K. T. Schulze*

vol. 14, Jan. 1961
Uber die Inkonstanz von Magnettonaufzeichnungen auf Film (p. 2) *F. Trommer u. E. Hilbig*
Die Klassifikation der Kurzzeitaufnahmeverfahren (p. 5) *A. A. Sacharow*

British Kinematography vol. 37, Aug. 1960
Streamlined Editing and Re-recording Techniques for Films for Television (p. 32) *P. J. Saunders*
The Eidophor System of Large-Screen Television (p. 44) *H. Jensen*

vol. 37, Sept. 1960
Recording Television (p. 60) *L. C. Jesty*
16mm Reversal Films for Television (p. 64) *R. J. T. Brown*

vol. 37, Nov. 1960
New Developments in Technicolor Release Printing (p. 112) *L. B. K. Happé*

vol. 37, Dec. 1960
Modern Trends in Cine Lenses (p. 140) *G. H. Cook*

International Projectionist vol. 35, Oct. 1960
Century Corporation's All Transistorized Sound System Said to Cost Less, Give Better Quality (p. 8) *L. Davee*
Print and Projection Data for "Spartacus," U-I's Super Technirama 70-mm Release (p. 12)

vol. 36, Mar. 1961
New Arc Mirror for Brighter Projection (p. 6) *A. J. Hatch*

Jour. British I.R.E. vol. 21, Feb. 1961
The Application of Modern Materials to Electronic Components (p. 107) *J. M. Herbert* and *R. G. Martin*
Symmetrical Transistors as A-C or D-C Switches and Their Applications in Modulator and Demodulator Circuits (p. 143) *J. F. O. Evans, D. A. Gill* and *B. R. Moffitt*
Waveguide Components: A Survey of Methods of Manufacture and Inspection (p. 169) *D. J. Doughty*
Sealed Contact Relays (p. 193) *J. G. Bannochie* and *R. A. E. Fursey*

Kino-Technik vol. 14, Sept. 1960
Der Eidophor-Fernsehprojektor (p. 253) *H. Jensen*
"Telerecording reversal"—für die Bildschirmaufzeichnung (p. 259)

vol. 14, Oct. 1960
Technische Fortschritte in der Rohfilmherstellung (p. 303) *K. Würstlin*
Die technische Entwicklung des Normalfilm-Projektors (p. 309) *H. Tümmel*

vol. 14, Dec. 1960
Photographie und Fernsehen—eine vergleichende Betrachtung (p. 367) *R. Theile*

vol. 14, Nov. 1960
Erfahrungen bei Film-und Fernsehaufnahmen im Operationssaal (p. 336) *W. Heiss*

Lichtquellen für medizinische Photographie und Kinematographie (p. 339) *L. Schneider*

vol. 15, Jan. 1961

Die Methoden der Röntgen-Kinematographie (p. 12) *H. Hallerbach u. A. Stangen*

vol. 15, Feb. 1961

Kinematographische Methoden in der Mikrobiologie (p. 39) *G. Poetschke*

vol. 15, Mar. 1961

Farbfernsehen im Dienste der Chirurgie (p. 71)
Schärfe-und Ausschnittkontrolle bei der Mikrokinematographie (p. 73) *R. Gander*
Umkopieren mit anamorphotischer Dehnung (p. 75)

Photo Technik und Wirtschaft

vol. 11, Sept. 1960

Die Bedeutung des 9.5-mm-Schmalfilms für Zweikanal-und Stereoton (p. 320) *H. Brauns*

PMI Photo Methods for Industry

vol. 4, Feb. 1961

8mm Sound; a Progress Report (p. 36)
Industrial Motion Pictures (p. 62) *A. Eagle*

Radiography **vol. 26, Oct. 1960**

Cineradiography (p. 303) *G. M. Ardran*

Research Film **vol. 3, No. 6, 1960**

A New Dolly-Boom and Light Complex for Medical Color Television (p. 340) *M. R. Klein, et al*
Time-Lapse Cinemicrography on the Permeability of Strain L-Cells to Lissamine Green (p. 366) *B. Holmberg*

Review of Scientific Instruments

vol. 32, Mar. 1961

Technique for the Cinephotomicrographic Study of Etching Phenomena (p. 325) *G. S. Tint* and *V. V. Damiano*

New Members

The following members have been added to the Society's rolls since the April 1960 *Directory* and those listed in the September, November and February *Journals*. Also listed are those regretfully reported as deceased since the February listing. The designations of grades are the same as those used in the Directory. An up-to-date list of the Sustaining Members appears on the outside back cover of each month's *Journal*.

Fellow (F) Active (M) Associate (A) Student (S)

Deceased

H. Walter Lotz (M) *Edward G. Kolberg (M)* *Luis Newhall (M)*
Paul Kocsis (A) *George E. Momberg (A)* *Vincent Pagliarulo (A)*
A. F. Victor (F)

Erratum

We regret that the name of **Louis B. Hoffmann,** 460 N. Barrington Ave., Los Angeles 49, Calif. (M), was inadvertently omitted from the alphabetic list of members published in the April 1960 Membership Directory.

Angas, Michael Fife W., General Mgr., Mole-Richardson (England), Ltd. Mail: 34 Redcliffe Rd., London, S.W. 10, Eng. (A)
Applegate, Robert L., Manager, A-V Dept., Burroughs Corp. Mail: 18880 Lancashire, Detroit 23, Mich.(A)
Arim, Maurice J., Photo. Dir., B.S.F.D., Inc. Mail: 18530 Dolores, Lathrup Village, Mich. (A)
Arnold, Robert A., Elect. Applications Eng., Laboratory for Electronics. Mail: 1018 W. Thomas St., Rome, N.Y. (A)

Baerg, James Robert, Univ. So. Calif. Mail: 12141 Silver Fox Rd., Los Alamitos, Calif. (S)
Baker, Aaron Jules, Lab. Techn., Consolidated Film Ind. Mail: 920 N. Spaulding Ave., Los Angeles 46. (A)
Baker, Hollis D., Mot.-Pic. Unit Chief, Boeing Airplane Co. Mail: 710 S. Kokomo, Derby, Kans. (A)
Bankar, Charandas, Supvr., C. U. Bankar, 616/2-Memb., Panchpaoli, C.N. 15/21, Nagpur 2, India. (A)
Batchelder, Robert, Radio-TV Field Eng., Voice of America, USIA. Mail: 308 Burnt Mills Ave., Silver Spring, Md. (M)
Baum, Frank E., M.D., 701 E. 63 St., Kansas City 10, Mo. (A)
Beaudoin, Guy, Pres., Montreal Royal Film Corp. Lab. Mail: 1240 St. Antoine, Montreal, Que., Can. (A)
Besky, Alec Nicholas, Ryerson Inst. Tech. Mail: 184 Heward Ave., Toronto 8, Ont., Can. (S)
Biggs, Marion Art, TV-Broadcast Chief Eng., KHOU-TV. Mail: Box 11, Houston 1, Tex. (A)
Bjerke, Oliver G., Transmitter Supvr., San Francisco-Oakland TV, Inc. Mail: 51 Lincoln Ave., Daly City, Calif. (A)
Blatchly, William Wayne, Ryerson Inst. Tech. Mail: 535 Highland Ave., Ottawa 3, Ont., Can. (S)
Bluth, Joseph E., Vice-Pres., Glen Glenn Sound Co. Mail: 4830 Arcola Ave., No. Hollywood, Calif. (M)
Bottomley, Geoffrey Malcolm, Ryerson Inst. Tech. Mail: 24 Barnsley Ct., Scarborough, Ont., Can. (S)
Braun, V. Joseph, Jr., Univ. So. Calif. Mail: 63 Deodar La., Bradbury, Duarte, Calif. (S)
Brociner, Michael, Cameraman, Montreal Cine Production. Mail: 3655 Jeanne Mance, Montreal, Que., Can. (A)
Brown, Thomas A., Sales, Electrical Parts, B-60 Ranch Crownsville, Md. (A)
Butterfield, James F., Pres., 3D-TV Co. Mail: Stereotronics Corp., 1717 N. Highland Ave., Los Angeles 28. (A)

Carr, Lester Hayden, Cons. Radio & TV Eng., Fort Evans Farm, Leesburg, Va. (M)
Cesare, Fontana, Student, Centro Sperimentale di Cinemat., Rome. Mail: Via Giosue Borsi, 10, Milano, Italy. (A)
Chalufour, Michel, Antioch Coll. Mail: Antioch College Student Union Bldg, Yellow Springs, Ohio. (S)
Chambers, George Russell, Cons. Radio & TV Eng., 414 French St., Wilmington, Del. (A)
Christie, John W., Accountant, Ralph's Grocery Co. Mail: 908½ N. Verduga Rd., Glendale 6, Calif. (A)
Collins, Wm. Dean, Sales Eng., Minnesota Mining & Mfg. Co. Mail: 401 Eatherly Dr., Nashville 4, Tenn (A)
Cooper, Michael, Video Service Mgr. Ampex International. S.A., Rue des Pilettes, 7, Fribourg, Switz. (M)
Cowap, Frederic W., Mot-Pic. Sound Eng., A-V Sect., U.S. Public Health Service. Mail: 5124 Tilly Mill Rd., Doraville, Ga. (M)
Cowdery, Charles, dba Graphicolor, 8132 W. Third St., Los Angeles 48. (A)
Crawford, John Dereck, TV Techn., Audio Oper., Canadian Broadcasting Corp. Mail: 20 Gardinal Pl., Toronto 12, Ont., Can. (M)
Crosby, John K., Head, Tech. Data Sect., Stanford Research Institute, 333 Ravenswood Ave., Menlo Park, Calif. (A)

Davidson, Lee E., Instrumentation Eng., U.S. Army Ordnance Corps. Mail: R.D. 2, Havre de Grace, Md. (M)
Davies, Kenneth Peter, Design Eng., TV Studio Equip., Canadian Marconi Co. CFCF-TV. Mail: 69 St. Francis Blvd., Chateauguay, Que., Can. (M)
de Castro, Manuel G., Chief, Photo. & Publications Div., Nat. Bureau of Investigation, Dept. Justice. Mail: 20 San Gabriel, Cubao, Quezon City, P.I. (M)
Delano, Erwin, Lens Designer, Bausch & Lomb, Inc. Mail: 271 Village La., Rochester 10, N.Y. (M)

De Soto, Larry, Film Editor, Trans-Artists Productions. Mail: 1772 E. Edgecomb St., Covina, Calif. (A)
DiGiulio, Edmund M., Engrg. Dir., Craig Research, Inc., 3410 S. La Cienega, Los Angeles 16. (A)
Dobbs, Frederick F. H., Asst. Lab. Mgr., Crawley Films. Mail: 163 Alymer Ave., Ottawa, Ont., Can. (A)
Dobish, Sidney, Asst. Cameraman, Camera Equip. Co., IATSE Local 644. Mail: 6211 Ave. "T", Brooklyn 34, N.Y. (A)
Dunn, Robert Milton, TV Maint. Eng., Great Western Broadcasting Corp. Mail: 2871 26 Ave., Sacramento 20, Calif. (A)
Duran, Edward H., Film Cutter, Trans Artist Productions. Mail: 1943½ N. Bronson, Hollywood 28. (A)

Faucon, Victor A., Sales Eng., Minnesota Mining & Mfg. Co. Mail: 54 Temple St., Arlington 74, Mass. (A)
Ferguson, Stuart Warren, Lab. Techn., National Film Board. Mail: 807 Albert Pl., St. Martin, Que., Can. (A)
Ferguson, Thomas Glenn, Photo. Eng., Eastman Kodak Co. Mail: 199 Kartes Dr., Rochester 16, N.Y. (A)
Ford, Edmond T., Projectionist, 110 Drive-in Theatre, Melville. Mail: 75 Altmar Ave., West Islip, N.Y. (A)
Ford, Patrick Francis, TV Prod. Asst., Canadian Broadcasting Corp.-TV. Mail: 1967 Avenue Rd., Apt. 2, Toronto 12, Ont., Can. (M)
Fortin, William, Mot.-Pic. Dir.-Writer, Marshall Space Flight Center, NASA, Bldg. 4746, Huntsville, Ala. (M)
Freiman, Samuel, City Coll. N.Y. Mail: 123-22 103 Ave., Richmond Hill, N.Y. (S)

Gast, John P., Mot.-Pic. Prodn. Officer, Dept. of Defense (DASA). Mail: 1 Cheverly Circle, Cheverly, Md. (A)
Gennaro, Tavernini, Chief Eng., Elect. & Radio Works, Ferberton C.A. Caracas-Milano. Mail: Apartado de Carabobo, Venezuela, (M)
Giordano, Nicholas J., TV Broadcast Eng., Columbia Broadcasting System. Mail: 2951 Ave. "P", Brooklyn 29, N.Y. (A)
Glaser, Edward M., Eng.-in-Charge, Elect. Lab., Kollsman Instrument Corp., 80-08 45 Ave., Elmhurst 73, N.Y. (A)
Goldhor, Stephen, Asst. Dir., Derrick Knight & Partners, Ltd. Mail: 180 W. King St., Hillside, N.J. (A)
Gorman, John F., Mot.-Pic. Prodn., Language Research, Inc., Harvard Univ., Westbrook St., Burlington, Mass. (A)
Groth, William H., Techn., Eastman Kodak Co., Kodak Pk., 1669 Lake Ave., Rochester 15, N.Y. (A)
Gurdjian, Elisha Stephens, M.D., Neurological Surgeon, 19385 Renfrew Rd., Detroit 21, Mich. (A)

Hansbrough, J. H., Attorney, 3218 Parkland Blvd., Tampa 9, Fla. (A)
Harris, Lee, Free-Lance Cameraman, 4445 N. Albany, Morton Grove, Ill. (A)
Hathaway, Jay, Chief Recording Eng., General Film Labs. Mail: 4846 Katherine Ave., Sherman Oaks, Calif. (A)
Havens, Donald C., Jr., Contract Eng., Westrex Corp. Mail: 79-11 41 Ave., Elmhurst 73, N.Y. (A)

Johns, Michael Ewart, Free-Lance Film Editor, 41 Stylecroft Rd., Chalfont St. Giles, Bucks, Eng. (A)
Johnstone, Hugh Allan, Ryerson Inst. Tech. Mail: 189 Gerrard St. E., Apt. 9, Toronto, Ont., Can. (S)
Jurgens, John, Jr., Eng., Photo-Sonics, Inc. Mail: 820 S. Mariposa, Burbank, Calif. (M)

Kaeselau, Chris, Film Editor, Swift Chaplin Prods. Mail: 17201 Gault St., Van Nuys, Calif. (A)
Katz, Jerry, Photo., Autometric Corp. Mail: 21-81 38 St., Long Island City 5, N.Y. (A)
Kelso, Arch Peter, Univ. Calif. L.A., Mail: 801 Malcolm, Los Angeles 24. (S)
Kerr, Charles A., Chief, Pictorial Branch, U.S. Army Home Town News Center. Mail: 1217 Redwood Dr., Independence, Mo. (A)
King, Barrie, Cornell Medical Coll., N.Y. Univ. Mail: 445 E. 69 St., New York 21. (S)
Knop, Harry W. Jr., Sales Supvr., Tech. Serv., Mot.-Pic. Prod., E. I. du Pont de Nemours & Co. Mail: 3 Meadowbrook La., Piscataway Towns., New Brunswick, N.J. (M)
Kohler, Robert J., Photo. Eng., Itek Corp. Mail: 36 Prescott St., Framingham, Mass. (A)
Korenthal, Jack, Free-Lance Director, 7425 W. Lake St., Morton Grove, Ill. (A)
Kottke, Richard H., Owner, Medical & Surgical Photo., Magna Film Service. Mail: Box 94, Glendale 5, Calif. (A)
Kufluk, Andrew, Teacher, Ryerson Inst. Tech. Mail: 668 Birchmount Rd., Scarborough, Ont., Can. (M)
Kyotow, George, Manager, U.S. Branch, Canon Camera Co., 404 Park Ave. S., New York 16. (A)

Larrigan, Lyle Whitfield, Ryerson Inst. Tech. 316 Ontario St., Toronto, Ont., Can. (S)
Latiolais, James Russell, Don Martin School of TV. Mail: 515 E. Valencia Ave., Burbank, Calif. (S)
Lerner, Murray, Dir., Writer, Cameraman, Ritter & Lerner. Mail: c/o MPO Prods., 15 E. 53 St., New York. (A)
Liebling, Otto, City Coll. Film Inst. Mail: 273 Bennett Ave., New York 40. (S)
Lowe, Harold T., Western Regional Mgr., Elgeet Optical Co., Mail: 13218 Warren Ave., Los Angeles 66. (A)
Luffman, Donald Stanley, M.B.K.S., Cinema Officer, Ministry of Information. Mail: 14 Courtland Ave., Ilford, Essex, Eng. (A)

Mahana, Geo. T., Film Editor, Grantray-Lawrence. Mail: 13429 Moorpark St., Sherman Oaks, Calif. (A)
Manchee, Richard S., Product Eng., Eastman Kodak Co. Mail: 16 Vincent Dr., Pittsford, N.Y. (A)
Mann, Harold B., Lab. Supvr., Pacific Title & Art Studios. Mail: 10818 Stagg St., Sun Valley, Calif. (A)
Marcoux, Oscar, Tech. Producer, TV, Canadian Broadcasting Corp. Mail: 615 Montrose, Laval. Que., Can. (A)
Massey George B., Prod. Coordinator, 1161 N. Highland Ave., Hollywood 38. (A)
McGill, Henry R., Jr., Eng., KQED-TV. Mail: 166 Morning Sun Ave., Mill Valley, Calif. (A)
McMann, Renville H., Dir., Engrg. Military Systems, CBS Laboratories. Mail: 60 E. 96 St., New York 28. (M)
Mehr, Morton H., Vice-Pres., General Mgr., Measurements Systems, Inc. Mail: 53 Water St., South Norwalk, Conn. (M)
Mena, Jose, Vice-Pres., Tech. Dir., Mont Royal Film Corp. Lab. Mail: 4550 Walkley, Apt. 27, Montreal, Que., Can. (A)
Michaels, John M., Video-Tape Maint. Eng., National Broadcasting Co. Mail: 6653 Bellingham Ave., N. Hollywood, Calif. (M)
Miller, Milan M., Wind-Tunnel Photo. Instrumentation, Douglas Aircraft Co. Mail: 5308 Village Green, Los Angeles 16. (A)
Miller, Richard M., Research Assoc., Lancaster Cleft Palate Clinic. Mail: 2410 Mayfair Dr., Lancaster, Pa. (A)
Moir, Gerald William, Photo. Dir., CFCN-TV, Calgary, Alta., Can. (A)
Morgan, James C., Project Eng., National Film Board. Mail: 838 Plymouth Ave., Apt. 328, Montreal 9, Que., Can. (A)
Morris, William W., Design Draftsman, Mot.-Pic. Printing Equip. Co. Mail: 4314 N. Central Park Ave., Chicago 18. (A)
Muller, Fred P., Free-Lance Radio-TV Techn., 24 Allen St., San Francisco 9. (A)

Nishimura, Jack J., Sound Recording Eng., USARHAW., Mail: 2467 E. Manoa Rd., Honolulu 14, Hawaii. (A)

O'Farrell, William Allan, Lab. Mgr., Crawley Films, Ltd. Mail: 197 Ellendale Crescent, Apt. 3, Ottawa, Ont., Can. (M)
Okubo, Masao, Member of Inspection Inst., Japan Camera Center, 389 Fifth Ave., New York 16. (A)

Parker, Luray, Mot.-Pic. Operator, Dept. 89, Beech Aircraft Corp., Wichita, Kans. (A)
Pascual E., Amadeo, Professor, Catholic Univ. of Valparaiso. Mail: Box 4059, Valparaiso, Chile. (A)
Payne, Cecil Edgar, Researcher & Writer, 5880 Hollywood Blvd., Hollywood 28. (A)
Peless, Yona, Elect. Lecturer, Israel Inst. Tech. Mail: 6A Vitkin St., Haifa, Israel. (A)
Pendas, Don Y., Professional Programs Mgr., Pfizer Laboratories, Div. of Chas. Pfizer & Co., 630 Flushing Ave., Brooklyn 6, N.Y. (M)
Perfilio, Luis Maria, Tech. Dir., TV (Channel 11), Buenos Aires. Mail: Maure 2180, Buenos Aires, Argentina. (M)
Pezzuto, Albert M., Supvr., Data Acquisition, PMR. Mail: Box 2093, Bendix Radio Div., Oxnard, Calif. (M)
Platt, Franklin N., Reliability Eng., Kollsman Instrument Corp. Mail: Duck Pond Rd., Locust Valley, N.Y. (A)
Prado, Theodore, Editor, Roy Patin Prods. Mail: 934 N. Avon St., Burbank, Calif. (A)
Prather, Wilfred C., Manager, Tech. Operations, National Broadcasting Co., Merchandise Mart, Chicago 54. (M)
Prendergast, Thomas P., 70/35mm Projection Tech. Supvr., Todd-AO Corp. Mail: 69 Transverse Rd., Garden City, N.Y. (A)

Richardson, William G., Industrial Photo., MIT Instrumentation Lab. Mail: 25 Robbins Rd., Watertown 72, Mass. (A)
Riester, Edwin H., Print Dept. Head, United Artists Corp. Mail: 95 Jefferson Ave., Roslyn Heights, N.Y. (A)
Robinson, L. Harriss, Marketing Dir., Westrex Corp. Mail: 540 W. 58 St., New York 19. (A)
Rose, Samuel W., Engr. Mgr., Closed-Circuit TV, Motorola, Inc. Mail: 7736 W. Taylor St., Forest Park, Ill. (M)
Rudling, Albert, Photo. Dir., Svensk Filmindustri, Solna 2, Sweden. (A)
Rylander, C. Huntly, Chief Special-Effects Dir., CBS-TV. Mail: 2 Burdsall Dr., Port Chester, N.Y. (A)

Saba, George A., Mot.-Pic. Cameraman, Lookout Mountain AFS, USAF. Mail: 1531 N. Fuller Ave., Los Angeles 46. (A)
Sabados, Zoltan William, Univ. So. Calif. Grad. Sch. Mail: 2052 S. Hobart Blvd., Los Angeles 18. (S)
Schank, Leo H., Eng., Fairchild Camera & Instrument Corp. Mail: 1 Richard Dr., W. Nyack, N.Y. (M)
Scher, Moe, Retired, 12530 Oxnard St., No. Hollywood, Calif. (A)
Scott, Dennis Arthur, Process Lab. Mgr., Miller & Wixley. Mail: Box 1341, Bulawayo, Southern Rhodesia, Africa. (A)
Shaw, William D., Lighting Dir., MGM Studios. Mail: 4208½ Overland Ave., Culver City, Calif. (A)
Smith, Myron P., Teacher, Radio-TV Dept., School of Communication Arts, University of Denver, Denver, Colo. (M)
Smith, Oscar Rutherford, Application Eng., Canadian General Electric Co. Mail: 55 Charles St. E., Apt. 903, Toronto 5, Ont., Can. (M)
Snel, Otto R., Sound Eng., S. A. Screen Prod., Div. 20th Century Fox. Mail: 127 Hugh St., Sunnyside, Pretoria, South Africa. (A)
Spaulding, G. E., Jr. Vice-Pres., Eng. Operations, Bell & Howell Co., 7100 McCormick Rd., Chicago 45. (M)
Stirling, William E., Industrial Photo., MIT Instrumentation Lab. Mail: 20 Felton St., Saugus, Mass. (A
Stoyanoff, Louis, Vice-Pres., General Mgr., Craig Research, Inc. Mail: 3410 S. La Cienaga Blvd., Los Angeles 16. (M)
Sullivan, Harris Marshall, Boston Univ. Mail: 205 Babcock St., Brookline 46, Mass. (S)
Swain, James B., Physicist, General Electric Co. Mail: 408 River Rd., R.D. 3, Baldwinsville, N.Y. (M)
Szadai, Tibor, Univ. Calif. L.A. Mail: 7231 Franklin Ave., Los Angeles 46. (S)

Theodoran, George C., Animation Cameraman, Ford Motor Co. Mail: 3393 Grange Rd., Trenton, Mich. (A)
Thompson, E. Francis, Producer, Francis Thompson, Inc. Mail: 332 E. 50 St., New York 22. (A)
Thompson, Jeff. Brown, Cinema Oper., Govt. Information Serv. Mail: Box R/W20 Lusaica, Northern Rhodesia, Central Africa. (A)
Thorn, James E., Tech. Repr., E. I. du Pont de Nemours & Co. Mail: 126 S. Lancaster Ave., Mt. Prospect, Ill. (A)
Thorne, R. Worley, Publicist, Charles A. Pomerantz. Mail: 4028 Perlita Ave., Hollywood 39. (A)
Tinsay, Gil P., Tech. Repr., Kodak Philippines, Ltd., 102-13 St., Port Area, Manila, P.I. (A)
Trad, Scylla, Univ. Calif. L.A. Mail: 1272 S. Beverly Glen, Los Angeles 24. (S)
Troy, Robert W., Sales Techn., The Animation Equipment Corp. Mail: 935 Euclid Ave., Santa Monica, Calif. (M)

Urbach, Howard Kenneth, Asst. Prairie Regional Eng., Canadian Broadcasting Co. Mail: 353 Oakwood Ave., Winnipeg 13, Manit., Can. (M)

Van Barneveld, Bert J., Mot.-Pic. Techn., National Film Board. Mail: 3010 Goyer St., Apt. 16, Montreal, Que., Can. (A)
Waldeck, Lewis E., City Coll. Film Inst. Mail: 42-25 80th St., Elmhurst 73, N.Y. (S)
Walker, Gerald N., Univ. Calif. L.A. Mail: 2114 Selby Ave., Los Angeles 25. (S)
Weintraub, Royd Lynn, Univ. So. Calif. Mail: 3751 S. Harvard, Los Angeles 18. (S)
Williams, Roy Francis, Eng., Computer Products Div., Lab for Electronics, Inc. Mail: Dept. 2602, 1079 Commonwealth Ave., Boston 15. (A)
Wlodarski, Stanley A., Lab. Techn., Eagle Film Lab. Mail: 2126 W. Haddon Ave., Chicago 22. (A)
Wray, Harold V., Eng., Geo. W. Colburn Lab. Mail: 520 Lowell Ave., Glen Ellyn, Ill. (M)
Wyers, Herbert B., Audio Eng., ABC-TV. Mail: 1141 Coolfield Dr., Covina, Calif. (A)

Youngling, Edgar A., Free-Lance Precision Optical Etcher, 24 Collins Rd., Glen Cove, N.Y. (A)

Ziarko, Charles Jerome, Univ. Calif. L.A. Mail: 1417 Veteran, #1, Los Angeles 24. (S)

Motion Picture Equipment Recently Developed in Japan

By KIYOHIKO SHIMASAKI

RECENT DEVELOPMENTS in Japan in the field of motion-picture engineering include a 70/35mm projector, a device for aerial photography and a silicon rectifier for projection.

Fuji Central Type 701 70/35mm Projector

This 70/35mm all-purpose projector, now installed in the Pantheon Theatre, Shibuya, Tokyo, has a magazine diameter of 600 mm. The take-up magazine is provided with a separate take-up motor and a control-relay switch. Conversion from or to 70mm is accomplished by exchange of sprockets and magnetic heads. The projector can be run at either 24 frames/sec or 30 frames/sec. The machine is provided with a built-in water and forced-air cooling device and a 19-in. cold mirror, with crater distance of 170 mm, aperture distance of 1,140 mm and 6.7 magnification, installed in the rotating positive lamphouse. A conical shutter aids in keeping the temperature rise at the aperture to a maximum of 30 C. The projector is manufactured by Hiraoka Kogyosho, Ltd., and is distributed by Victor Sound Equipment, Ltd.

The projection lens (f/2.1 with a focal length of 63mm) was designed by Keihan Optical Co., Osaka, and manufactured by its subsidiary, Cornie Optical Works, Ltd., Tokyo.

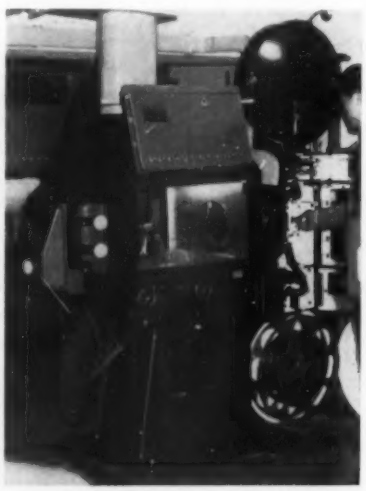
The arc-rectifier newly installed in the Pantheon Theatre is the SC-12A-14 made by the Takanawa Electric Works Co. It delivers 180 amp at maximum voltage of 80 v. The Theatre, which continues to use its mercury rectifier for 35mm, has a specially designed control relay board which the projectionist operates as a remote control system.

One of the accessory equipments is a power film rewinder which handles a reel of 70mm film in 5 to 6 min. The motor cuts off automatically when the rewinding is finished.

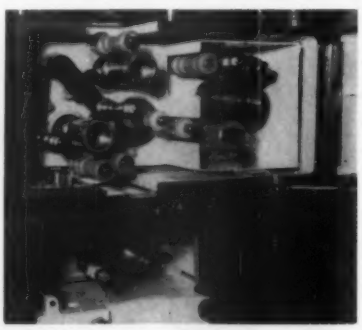
Aerial-Photographic Device for Arriflex 35

This device has been designed and manufactured especially to mount the Arriflex 35 on Cessna aircraft. The body, made of light-metal alloy, incorporates an anti-vibration system and can be fitted with any anamorphic lens. With this device the camera can tilt and pan to 90° and 360°. The fixed viewfinder changes the angle in interlock so as to assure the corresponding field without shifting the eye position. The device is made by Seiki Seisakusho Co.

A contribution of Kiyohiko Shimasaki, Managing Director of the Motion Picture Engineering Society of Japan, Sankei Kaikan Bldg., Rm. 721 No. 3, Otemachi-1, Chiyoda-Ku, Tokyo, Japan. These products were first described in *Motion Picture Engineering*, the journal of the Japanese society and received too late to be incorporated in the Progress Report in this issue of the *Journal*.

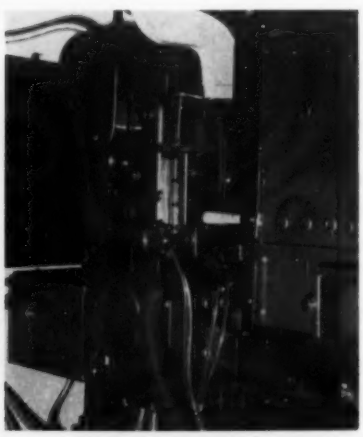


Fuji Central Type 701 70/35 Projector.

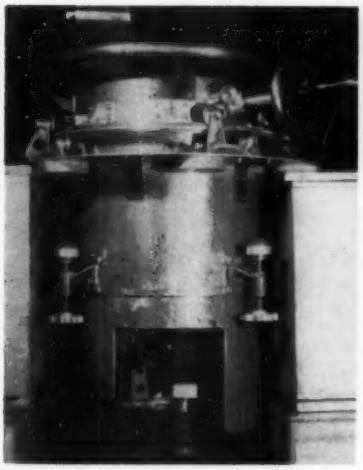


Exchangeable sprockets and sound heads.

Part of the cooling system.



Aperture.



Aerial-photographic device for Arriflex 35.

Silicon rectifier for projection.

Silicon Rectifier for Projection

A Silicon Rectifier, a product of Takanawa Electric Works Co., Tokyo, especially designed for d-c output exceeding 100 v, has been installed in the Iino Hall at Uchisaiwai-cho Chiyoda-ku, Tokyo. In announcing this product it was noted that silicon was used as long ago as 1904 as a detector in radio receivers. Although this application was by-passed by the development of the vacuum tube, the development of the silicon transistor in 1948 and the silicon rectifier in 1956, suggested new applications. The new rectifier was constructed to be shockproof and resistant to heat, cold and humidity.

Advanced Studio Sound Facilities in India

By P. A. PESTON JAMAS

A FACT NOT ALWAYS recognized is that India is one of the largest film-producing countries in the world, and has over fifty film studios; a few of them quite modern.

One such studio is Rajkamal Kalamandir of Bombay, which has been the recipient of five awards for sound recording. The sound department, recently modernized and expanded, is of special importance because vocal and orchestral music form an important part of all full-length Indian pictures. Hardly a picture is made that does not have a generous quota of music and songs. Multichannel control of music recording was decided upon so that balance, between sections of the orchestra could be conveniently altered following the original recording, or a song replace a song in another language. Other considerations were flexibility; economy (achieved by reducing the recording time of the live orchestra); and adaptability to processes such as CinemaScope (achieved by provision for the addition of some units without making obsolete the recently installed equipment).

Multilanguage use is provided for by the "International Track" facility.

General

The modernization plan was carried out by Westrex, India. Most of the equipment was manufactured in the United States except for special items designed and fabricated in India.

The new installation includes a six-track 35mm magnetic system consisting of an RA-1552-C-6 recorder, a modified RA-1565-D transmission cabinet and an RA-1551-E-6 reproducer. The multichannel mixing equipment consists of two RA-1524-G mixers, one RA-1543-A equalizer, one input selector unit, and one output mixing unit. The last two items were designed and fabricated in India. The mixing equipment is assembled in a locally made console installed in the monitoring room.

The studio also contains an 1100 series 35mm magnetic single-track system, and a 735 Deluxe 35mm photographic system, currently used as a transfer channel (Fig. 1). The re-recording mixer has six input positions, fed from four RR3S re-recorders (fitted with high-speed rewinds and looping cabinets), and two R-7 soundheads which form part of the RR-7230 sound projection equipment. The re-recording mixer is a four-position console with a two-position attachment, made in India and containing facilities for the addition of an "International Track" channel to provide re-recording in other languages, in the future (Fig. 2).

The motor system for the re-recorders as well as the six-track magnetic recorder, and the six-track magnetic reproducer is of the multipurpose type using RA-1409 and RA-1519-A motors. Wall-mounted motor control and motor starting boxes were made in Hollywood for use with the re-recorders and soundheads.

A contribution submitted on March 20, 1961, by P. A. Peston Jamas, Westrex Co. India, Metro House, Esplanade Rd., Bombay 1, India.

An RA-1558-A Volume Indicator Projector is used adjacent to the projection screen for visual metering of the audio levels during re-recording.

Six-Channel Recording System

Equipment for track substitution is particularly important in India where the problem of multilanguage picture production exists; for example, it is often desirable to use the same orchestral accompaniment to several different language versions of a song.

Also provided for is the making of multichannel stereophonic recordings for processes, such as CinemaScope, by adding equipment with the necessary circuit alteration to the present installation. Provision for six-channel loudspeaker monitoring is incorporated in the system, although at present single-speaker monitoring is used.

During a recording session, up to five microphone inputs from the various orchestral and vocal sections are selected at the input selector unit; fed to the inputs of the two multichannel mixers; and recorded separately as five tracks on a single 35mm film on the six-track magnetic recorder. The five monitor lines from the associated transmission cabinet are routed to the output mixing unit via the equalizer unit. Both units are located on the mixer console. These monitor lines are thus equalized, or filtered, then mixed and monitored, and eventually fed to the sixth input of the multichannel mixer combination to be recorded simultaneously as the composite sixth track on the same 35mm film. This sixth track serves as a guiding track for making the final balanced, corrected and equalized master magnetic track for transfer to photographic. To make the master magnetic track, the film is run on the six-track reproducer, from whence the signals are routed through the equalizer unit and the multichannel mixers. The composite track is then re-recorded.

In substituting, for example, a song in another language, all the original individual tracks, except the original vocal and composite, are re-recorded. During this process, the relative vocal channel key at the input selector unit is operated to the 30-ohm microphone input to pick up and record the live substituted song in the new language. The cue to the vocalist is provided by the music through a headset system. The sixth new composite track with any music equalization or filtering, and including the new vocal, is also recorded simultaneously.

The transfer to photographic release negative is invariably made from the final master magnetic composite track. Six 30-w monitor amplifiers supply the power for the six-channel loudspeaker monitoring system and the headset distribution system.

Input Selector Unit

All microphone 30-ohm outputs and 600-ohm lines terminate on a jack patch bay of the input selector unit. Six selected outputs of the several 30- and 600-ohm sources are brought to six three-position selector keys. Each key provides selection of a 30- or a 600-ohm source or a 30-ohm terminating resistor with one leg of a test oscillator bridging mesh across it. These keys simplify patching problems.

The test oscillator mesh bridges a 600-

Fig. 1. The RA-1551-E-6 Magnetic Reproducer beside the 735 Photographic Recording System.

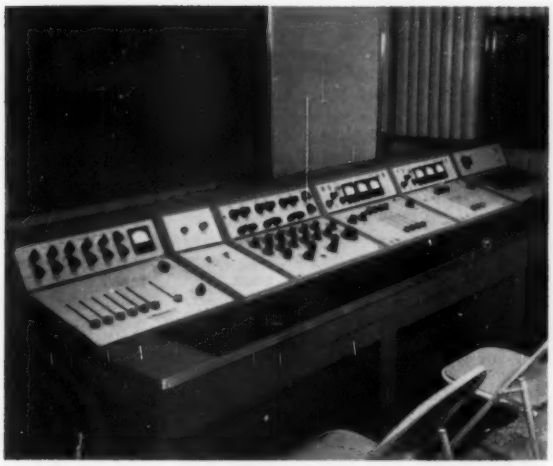


Fig. 2. Six-channel multitrack recording and mixing console. The two units on either end of the console as well as the console structure were fabricated in India.

ohm terminated oscillator output and furnishes a low-level bridging signal simultaneously to the six, 30-ohm resistors which come across the mixer inputs when the keys are in "Test" position. Any key or keys can be manipulated without affecting the oscillator levels in the other channels. A recorded or visual check of the gain and frequency characteristics of all six channels can be made in one operation when the keys are in the "Test" position.

If the oscillator is patched out, the 30-ohm mixer input terminating resistors at the "Test" key positions are used to provide "arbitrary" noise level readings for each mixer input, also in one operation.

Mixer inputs and various other low-level circuits such as the disc recorder input, disc outputs, photographic recorder input, etc., appear on the patch bay of this unit. The six photographic re-recorder outputs are also routed via this patch bay to the re-recording mixer located in the auditorium.

The unit also contains a universal low-impedance-matching and bridging network with provision for amplification of 40 or 50 db when desired, of a low-level, low-impedance source. The amplifier output, controlled by a variable attenuator installed before the amplifier, is available at 30- or 600-ohm impedance. The attenuator can also be used separately if required, with or without the matching transformer, for attenuating any relatively high-level input.

The Multichannel Mixers

Two RA-1524-G mixers are combined to provide six inputs to six channels. These incorporate linear drive slide attenuator controls. Only simple switching or plugging is required for various modes, such as up to eight inputs, to one through six channels. The two mixers can also be adapted for twelve inputs to one channel operation.

RA-1543-A Equalizer Unit

All high-level monitoring lines (direct/film) from the transmission cabinet are routed to the inputs of the equalizer unit in the mixer console, and are then fed to the output mixing unit. The equalizer unit contains three "Hi-Lo" program equalizers and three high-pass and low-pass filters, "telephone"- and "radio"-effects filters, circuit transfer switches, effects-channel combining network, and a Pan-Pot (the latter two for stereo recording). All facilities are available on a self-contained patch strip.

Output Mixing Unit

The five monitor lines equalized or filtered by the equalizer unit are mixed into a single channel in the output mixing unit. This is done by bridging the emerging lines from the equalizer and then mixing them, thus permitting well over 40 db isolation between the individual channels comprising the composite channel. The equalizer lines find their termination at the monitor ON/OFF switches and the loudspeaker monitor amplifiers. This crosstalk figure of over 40 db was necessitated by the requirement that each of the equalized or filtered equalizer outputs making up the composite mixed

channel, be selectively monitored on a speaker and simultaneously inspected on a V.I. meter. Switches are provided to introduce or disconnect any of the bridged lines in the bridging-mixing network without disturbing any circuit impedance.

The sixth composite channel can be also metered and monitored at the output mixing unit.

The signal of this mixed single channel is eventually fed into the sixth position of the multichannel mixer combination for recording simultaneously on the same 35mm film, the sixth and composite track. The mixed composite channel can alternately be fed into a separate photographic or magnetic recording system input. This facility permits recording of six individual inputs on the multitrack recorder and the seventh composite track on a separate outside recording system. The recording bus level of such an outside system can also be metered and monitored. All these metering and monitoring functions are available by selection of various points on a rotary switch.

Re-Recording Components

The re-recording equipment is essentially designed for single-track release. The projection booth houses the four re-recorders and the two-machine review re-recording system. The re-recording mixer with its two-position attachment is installed in the review/re-recording theater. This mixer combination accepts the six re-recorder outputs. These are mixed to provide two separate and simultaneous channels. One can contain up to all six of the re-recorder signals, and the other up to four of the same signals with a view to excluding dialogue. Recordings are made simultaneously from these channels. The second "dialogueless" record is kept for use for re-recording of multilanguage versions.

Multipurpose motors are used throughout. Motor control boxes offer the motors for selection between two interlock buses or controlled-torque starting as ordinary 3-phase synchronous motors, individually. The motors can also be run fast-forward for cuing when desired.

The motor starting box installed in one interlock bus permits starting in interlock of all motors selected with the control box. The transmission equipment cabinet of the review re-recording system includes two film loss equalizers and a re-recording monitor input with an associated equalizer. The 30-w theater amplifier can be switched to the theater speaker system, or a dummy load across which is provided the facility of a V.I. meter for day-to-day film transmission check-ups.

Another facility provided in the equipment is an arrangement by which the original magnetic recording from the six-track film can be played back through the theater system in the review room to simulate standard "optical-recording" theater quality.

The main review re-recording theater (also used for music recording) and a second smaller review room are interconnected by a window. Extensive rotary and drop-over wall sections in the main theater are used to adjust the acoustics. The multichannel mixer equipment is in the monitoring room where a glass window affords a view into the main re-recording theater, and one of the two vocalists' rooms.

All major rooms are "silent" air-conditioned.

Three wall-mounted continuous troughs or channels of sheet iron, one each for "low-level speech," "high-level speech" and "power" run through and interconnect every room. Results achieved by installation of the new equipment surpass early expectations.

The credit for furnishing basic operational requirements of the system is due to V. Padmakar, Chief Technician, M. Parmar and Mangesh Desai of Radjkamal Kalamandir studio. The installation also owes its success to the cooperative and diligent work of Westrex engineers and the studio staff.

employment service

These notices are published for the service of the membership and the field. They are inserted three months, at no charge to the member. The Society's address cannot be used for replies.

Positions Wanted

Film Production Administrator. 24 yrs experience in industrial motion-picture and general photography production. Technical background in most crafts; writer and director-cameraman. Until recently vice-president in charge of sales for production company in New York; familiar with government contracts and security problems. Currently free lancing but wish to settle down again; will relocate. Dermid Maclean, 8 Cameron Rd., Tenafly, N.J.

Cameraman-Director, 40, Class "A" IATSE New York, seeks interesting, challenging assignment or top position. 19 yrs production work in studio and on locations all over Europe, Asia and Africa. Producer for U.S. Government; experienced in studio and production center organization, training of technical staff, supervision of film editing and completion. Technical consultant, familiar with most U.S. and foreign equipment. Fluent German, French, some others. Writing credits; internatl. film award. Prefer educational and documentary field, also highly technical training and industrial films. Shooting all types of productions; flawless and imaginative coverage on any subject, anywhere. Permanent relocation possible. Cinematographer, 92 Park Hill, Massapequa, L.I., N.Y. LI 1-9487.

Cameraman-Editor. Since 1935 active in production of documentaries, television commercials, educational, industrial and progress report films, can handle both 35mm and 16mm black-and-white as well as color. Wants steady work or assignments, anywhere. Can edit A and B rolls, and write own scripts. Modest fee. Will send resume on request. Henrick N. Weener, 1215 Cabrillo Ave., Venice, Calif. EX 9-5692.

Motion-Picture Editor and Cameraman. Presently with a multicam film project at Univ. of Ill. as Head Editor and Head Cameraman.

Formerly with N.O.T.S. China Lake as Cameraman and Editor. B.A. and part M.A. from Univ. of Southern Calif., Dept. of Cinema. Also experienced in teaching basic cinema, motion-picture laboratory, still work, and other aspects of film production. Interested in a challenging position with potential. Write for resume or Form 57; Stanley Follis, 908 W. Maple St., Champaign, Ill.

Positions Available

Motion Picture Sound Engineer. Experienced in recording motion picture soundtracks, transferring and mixing. Familiar with design and circuits of professional equipment. Desire to work for religious film unit. Write for application to TRAFCO of The Methodist Church, c/o Duane Muir, 1525 McGavock St., Nashville 3, Tenn.

Closed-Circuit TV Technician or Engineer. Experienced. Must be familiar with all phases of closed-circuit television systems. To work with Chief Engineer of West's largest producer of CCTV equipment. L. G. Schlicht, 1920 So. Figueroa St., Los Angeles 7, Calif. Richmond 8-2852.

16mm Film Editor, permanent staff, experienced, possibility of some directing. Church related film unit, with studio in Nashville, Tenn. Productions include dramatic, documentary and panels. Write TRAFCO of The Methodist Church for application, c/o Duane Muir, 1525 McGavock St., Nashville 3, Tenn.

Engineer. Position for individual with degree in Industrial Engineering, Photography or related field. Experience with motion-picture laboratory or data-processing equipment essential. This position is located in Florida. If interested, please forward resume to W. F. Marquette, RCA Employment Office, Patrick AFB, Florida.

Aero-Space Technology. Positions with National Aeronautics and Space Administration, Washington or other installations, from $5335 to $21,000 a yr. For applications and information on positions in physical sciences, engineering and mathematics; life sciences and systems; or research & development administration; write to Board of U.S. Civil Service Examiners, NASA, at any of the following Centers: Ames Research Center, Mountain View, Calif.; Flight Research Center, P.O. Box 273, Edwards, Calif.; Goddard Space Flight Center, Greenbelt, Md.; Langley Research Center, Hampton, Va.; Lewis Research Center, Cleveland 35, Ohio; Marshall Space Flight Center, Huntsville, Ala.

Mechanical Engineer (Motion Picture Cameras). Must have Mech. Eng. degree. Prefer 3 yrs experience in design of professional motion-picture cameras for theatrical and instrumentation fields. Work involves design and manufacture of 16mm and 35mm professional double-system and single-system cameras as well as high-speed instrumentation cameras. Excellent opportunities. Submit detailed resume in triplicate to 126 Warren Rd., Park Ridge, N. J.

Journals Available/Wanted

These notices are published as a service to expedite disposal and acquisition of out-of-print Journals. Please write direct to the persons and addresses listed.

Available

Jan. 1936 through Mar. 1957, except Mar. 1942 and Jan. 1945. Send offer to: R. S. Parris, 29 Charles St., Natick, Mass.

Assortment of Journals, from 1937 through 1950. Write: Alan Cook, South Londonderry, Vt.

Complete set of Journals March 1937 through May 1954. Best offer. A. R. Ulmer, 69 Cresskill Ave., Dumont, N. J. DU 4-8656.

Complete set of Journals January 1949 through December 1960, inclusive, including high-speed, special issues, indexes, directories, etc., in excellent condition. For sale as entire lot only. Leslie Helhena, P. O. Box 643, Burbank, Calif.

Complete set of Journals from January 1934 through June 1960. Excellent condition. For sale only as a set. Write: Don Norwood, 1470 San Pasqual St., Pasadena, Calif.

Complete file, Vol. I No. 1 through Dec. 1959 with indexes. Fine condition: $500. James G. Barrick, 15726 Fernway Ave., N. W., Cleveland 11, Ohio.

Complete set of Transactions, except Nos. 6 and 9, and all Journals published to date, including indexes. All in good condition. Price $500. Also extra copies of Transactions Nos. 21, 31, 32. W. W. Hennessey, RFD #2, Pound Ridge, N. Y.

Complete set of Journals from May 1937 to June 1954, including special volumes and membership directories, excellent condition; also Mar., May 1934 and July 1935 issues. Write: Harry R. Lubcke, 2443 Creston Way, Hollywood 28, Calif. HO 9-3266.

Jan-Dec. 1950; Jan., Feb., Apr.-Dec. 1951; Jan-Mar. 1952. Also available are vols. 6 and 7 of The Television Society (British) covering the period Jan. 1950 through Sept. 1955. Write: Andrew N. McClellan, 65 Hillside Drive, Toronto 6, Ont., Canada.

Dec. 1946, Feb.-Dec. 1947, 1948–1955 complete. All copies in perfect condition; for sale as entire lot only. Write: Joseph W. MacDonald, 2414 Sullivant Ave., Columbus 4, Ohio.

Jan. 1947 to Dec. 1957 complete and in perfect condition. For sale only as a set. Write: Charles J. Marshall, 2816 Royalston Ave., Kettering 19, Ohio.

Complete set of Journals Jan. 1949 to Dec. 1958. Perfect condition. What offers? Write: J. G. Jackson, 210 Kingsway South, Port Alberni, B. C., Canada.

Wanted

Jan., July, Sept. and Nov. 1949; Jan and Feb. 1950. Century Lighting, Inc. (Mrs. Levine), 521 W. 43 St., New York 36, N.Y.

Feb., Mar., Apr., June 1934. Mrs. Janet Van Duyn, Librarian, CBS Laboratories, 227 High Ridge Rd., Stamford, Conn.

Journals—Bound volumes. Write: S. P. Solow, Consolidated Film Industries, Inc., 959 Seward St., Hollywood.

Transactions 6 and 9 ($15 each offered). W. W. Hennessey, RFD #2, Pound Ridge, N.Y.

Jan. 1938, Jan. 1949. (Many other issues are available for trade.) Dept. of Cinema, Univ. of Southern Calif., University Park, Los Angeles 7. Att: Herbert E. Farmer.

Transactions No. 1, 1916 ($5 offered); No. 6, 1918 ($10 offered); No. 7, 1918 ($10 offered). James G. Barrick, 15726 Fernway Ave., N.W., Cleveland 11, Ohio.

Mar. 1939, May 1940, July, Feb. 1942, July 1949. V. E. Patterson, 2 North 30th St., Phoenix, Ariz.

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News Columns

Advertisers

Meeting Calendar

SPSE, Annual Conference, May 22–26, Arlington Hotel, Binghamton, N.Y.

AIEE, IRE, Association for Computing Machinery, Western Joint Computer Conference, May 9–11, Ambassador Hotel, Los Angeles.

Acoustical Society of America, Spring Meeting, May 11–13, Bellevue-Stratford Hotel, Philadelphia.

IRE Professional Group on Microwave Theory and Techniques, National Symposium May 15–17, Sheraton-Park Hotel, Washington, D.C.

AIEE, ARS, IAS, IRE, ISA, National Telemetering Conference, May 22–24, Sheraton Towers Hotel, Chicago.

IRE, AIEE Global Communications Symposium, May 22–24, Sherman Hotel, Chicago.

American Society for Quality Control, Annual Convention and Exhibition, May 22–24, Sheraton Hotel, Philadelphia.

ISA, Summer Instrument-Automation Conference, June 6–8, Royal York Hotel and Queen Elizabeth Hall, Toronto, Ont.

ASME, Summer Annual Meeting, June 11–14, Statler Hilton Hotel, Los Angeles.

AIEE, Summer General Meeting, June 18–23, Ithaca, N.Y.

American Rocket Society, Institute of the Aerospace Sciences, Joint Midyear Meeting, June 19–22, Los Angeles.

American Physical Society, Meeting, June 22–24, Univ. of Mexico, Mexico City, Mex.

IRE, National Convention on Military Electronics, June 26–28, Shoreham Hotel, Washington, D.C.

AIChE, AIEE, ASME, IRE, ISA, Joint Automatic Control Conference, June 28–30, Univ. of Colorado, Boulder, Colo.

British IRE, Annual Convention, July 5–9, Christ Church, Oxford, England.

IFME, JECMB, IRE-PGBME, 4th International Conference on Medical Electronics and 14th Conference on Electronic Techniques in Medicine and Biology, July 9–14, Waldorf-Astoria Hotel, New York.

NAVA, Annual Convention, July 22–25, Hotel Morrison, Chicago.

American Rocket Society, Guidance and Control Conference, Aug. 7–9, Stanford Univ., Stanford, Calif.

SPIE, National Convention, Aug. 7–10, Ambassador Hotel, Los Angeles.

Western Electronic Show and Convention, Aug. 22–25, San Francisco.

American Chemical Society, 6th International Conference on Coordination Chemistry, Aug. 27–Sept. 1, Wayne State Univ., Detroit, Mich.

UFPA, Annual Meeting, August 1961, Berkeley Campus, U. of California.

American Chemical Society, National Meeting, Sept. 3–8, Chicago.

IRE, National Symposium on Space Electronics and Telemetry, Sept. 6–8, Albuquerque, N.M.

PGIT, International Symposium on Transmission and Processing of Information, Sept. 6–8, MIT, Cambridge, Mass.

AIEE, ISA, IRE, Joint Nuclear Instrumentation Symposium, Sept. 6–8, North Carolina State College, Raleigh, N.C.

ISA, Fall Instrument-Automation Conference and Exhibit, Sept. 11–15, Memorial Sports Arena, Los Angeles.

Standards Engineers Society, Annual Meeting, Sept. 18–20, Hotel Sherman, Chicago.

IRE, AIEE, Industrial Electronics Symposium, Sept. 20–21, Boston, Mass.

Illuminating Engineering Society, National Technical Conference, Sept. 24–29, Chase-Park Plaza Hotel, St. Louis, Mo.

Electrochemical Society, Fall Meeting, Oct. 1–5, Statler Hotel, Detroit, Mich.

IRE, Canadian Electronic Conference, Oct. 2–4, Automotive Bldg., Exhibition Park, Toronto, Ont.

90th Semiannual Convention of the SMPTE, Oct. 2–6, Lake Placid, N.Y.

National Electronics Conference, Oct. 9–11, International Amphitheatre, Chicago.

American Standards Association, National Conference, Oct. 10–12, Rice Hotel, Houston, Texas.

Society of Reproduction Engineers, Visual Communications Congress, Dec. 1–4, Hotel Biltmore, Los Angeles.

91st Semiannual Convention of the SMPTE, Apr. 30–May 4, 1962, Ambassador Hotel, Los Angeles.

92nd Semiannual Convention of the SMPTE, Oct. 22–26, 1962, Drake Hotel, Chicago.

93rd Semiannual Convention of the SMPTE, Apr. 22–26, 1963, Traymore Hotel, Atlantic City, N.J.

SMPTE Officers and Committees: The rosters of the Officers of the Society, its Sections, Subsections and Chapters and of the Committee Chairmen and Members were published in the April 1961 Journal.

sustaining members

of the Society of Motion Picture and Television Engineers

The objectives of the Society are:

- Advance in the theory and practice of engineering in motion pictures, television and the allied arts and sciences;
- Standardization of equipment and practices employed therein;
- Maintenance of high professional standing among its members;
- Guidance of students and the attainment of high standards of education;
- Dissemination of scientific knowledge by publication.

Progress toward the attainment of these objectives is greatly aided by the financial support provided by the member companies listed below.

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  Altec Lansing Corporation
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The Society invites applications for Sustaining Membership from other interested companies. Information may be obtained from the Chairman of the Sustaining Membership Committee, Ethan M. Stifle, Eastman Kodak Co., Room 626, 342 Madison Ave., New York 17, N.Y.